

The BOY MECHANIC

BOOK
4



1349 ARTICLES - 1320 PICTURES



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THE BOY MECHANIC BOOK 4

A Book That Tells How to Make Things

Simple directions for making devices of interest to every boy,
man, woman, and girl. Here is a partial list of
the most important subjects treated:

Amateur photography
Boat building
Boat sailing
Homemade gymnasium
equipment
Household devices
Magic tricks
Scientific instruments
Camping equipment
Radio receivers
Poultry equipment
Garden tools

Toy making
Fishing devices
Hunter's equipment
Sewing helps
Cooking devices
Automobile improvements
Painting helps
Electrical devices
Devices for summer sports
Devices for winter sports
Shop kinks
Furniture repairs

1349 ARTICLES—1320 ILLUSTRATIONS

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Laboratory Workers
Sheet Metal Workers
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—in fact, for everyone who has the slightest mechanical instinct, including women.

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As an indication of the universal interest represented in the articles in this volume, the following brief list of general headings is given. In most cases, there are many items to be classified under each heading as given. The important thing for you to know in using the book is that each article tells how to make, repair, or improve something that is entertaining or useful.

FOR BOYS	FOR MEN	FOR WOMEN	FOR GIRLS
Toy airplanes	Auto accessories	Rocking chairs	Artificial pearls
Kites	Cartridges	Rag rugs	Bird baths
Water scooter	Drawing equipment	Scissors	Beads
Walking toys	Furniture repairs	Sewing machines	Bookmarks
Boats	Electric devices	Silverware	Cameras
Magic tricks	Fencing	House plants	Musical instruments
Motorcycle	Filing devices	Washing machine	Croquet sets
Tents	Orchard	Stoves	Etched glass
Springboards	Hunting accessories	Vacuum cleaner	Handbags
Games	Garage	Window curtains	Flowers
Sand engine	Shop equipment	Gardening	Tennis
Steam engine	Guns	Baby carriage	Piano stunts
Swings	Fishing equipment	Poultry	Sofa pillows
Tops	Radio	Bread making	Place cards
Pushcycle	Gas engines	Carpets	Decorative lamps

Suppose, for example, that you have a rocking chair that tips backward. You look in the index for “Rocker.” Under that heading you find this item, “Wedges prevent tipping of rocker—375.” Turning to page 375, you get complete directions for remedying the trouble.

Your car needs a coat of varnish. You will probably look under "Automobile." Under this heading you find no item telling about varnishing a car. But, if you look in the parenthesis following the word "Auto" in the index, you will see that you are referred also to the word "Varnishing." Turning to that word you find that on page 390 there is an article giving hints on varnishing a car.

If you want to make a toy, but are not sure what you would like to make, you can turn to the heading, "Toys" in the index and there you will find a list of 26 toys, and, in addition, you will be referred to other headings under which you will find 23 other toys. From these lists, a selection can be made, and the directions for making the toy then quickly found.

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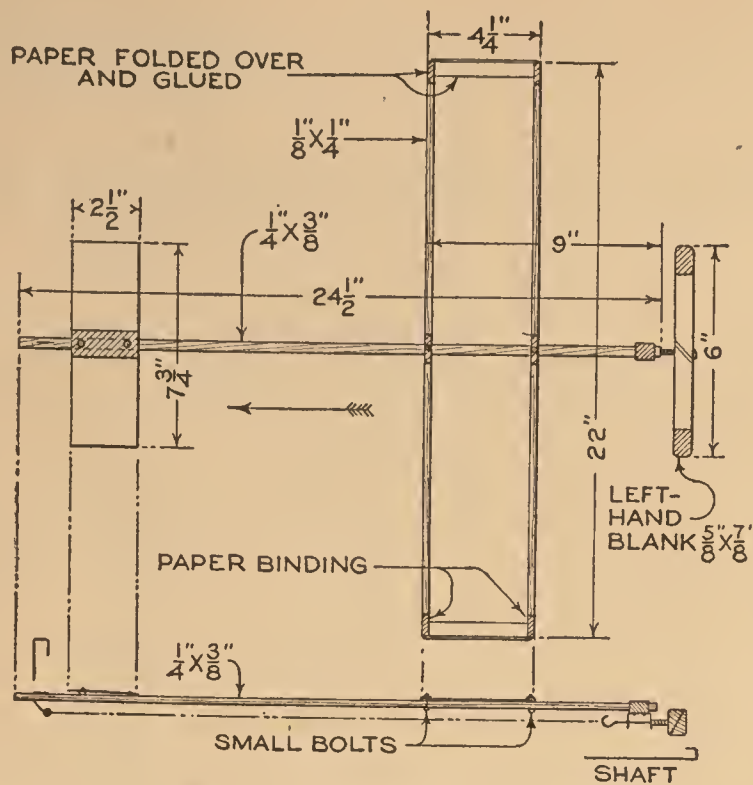


Fig. 1 RACER TYPE

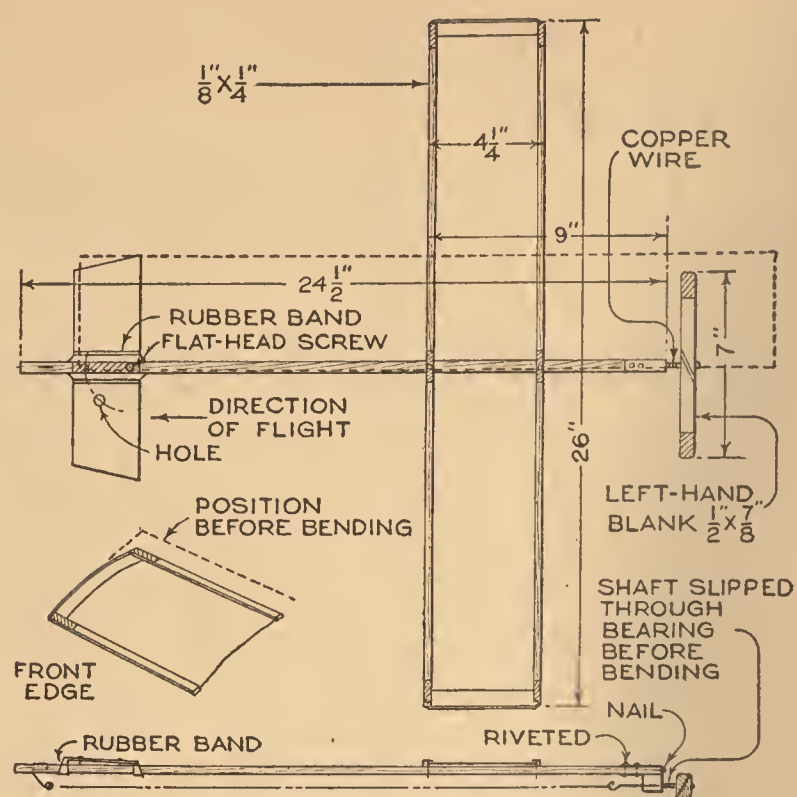


Fig. 2 FLY-ABOUT TYPE

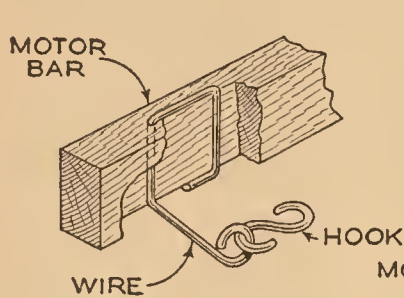


Fig. 3

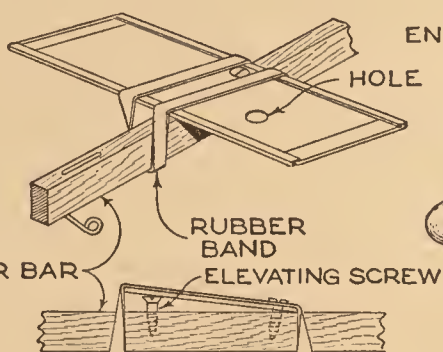


Fig. 4

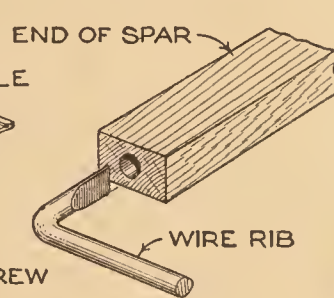


Fig. 5

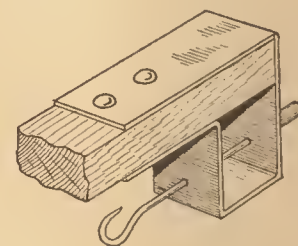


Fig. 6

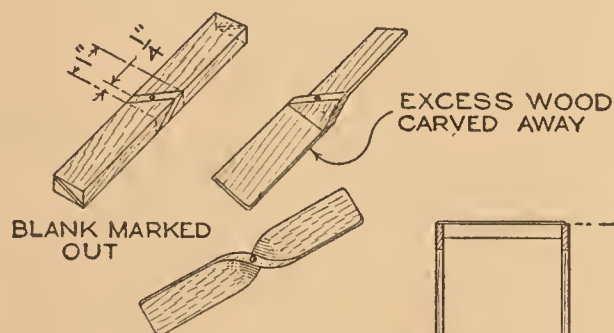


Fig. 7

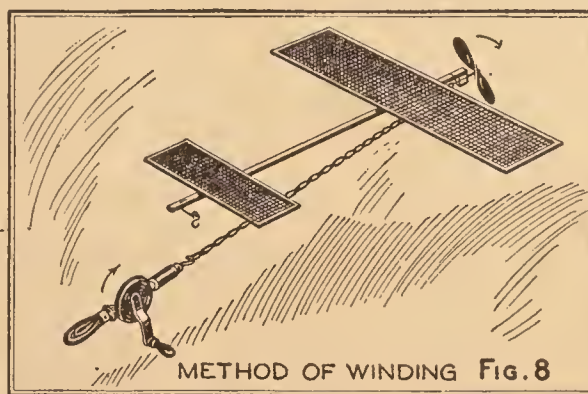


Fig. 8

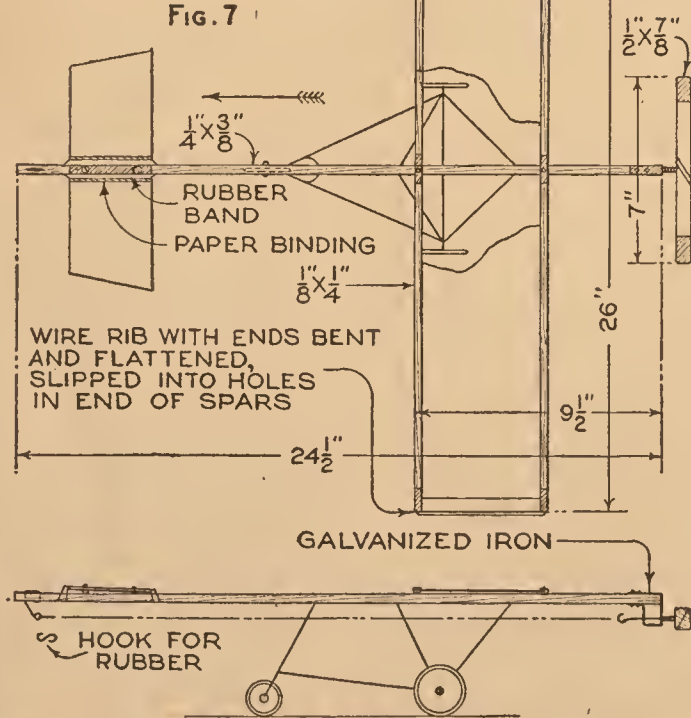


Fig. 9 R.O.G. TYPE

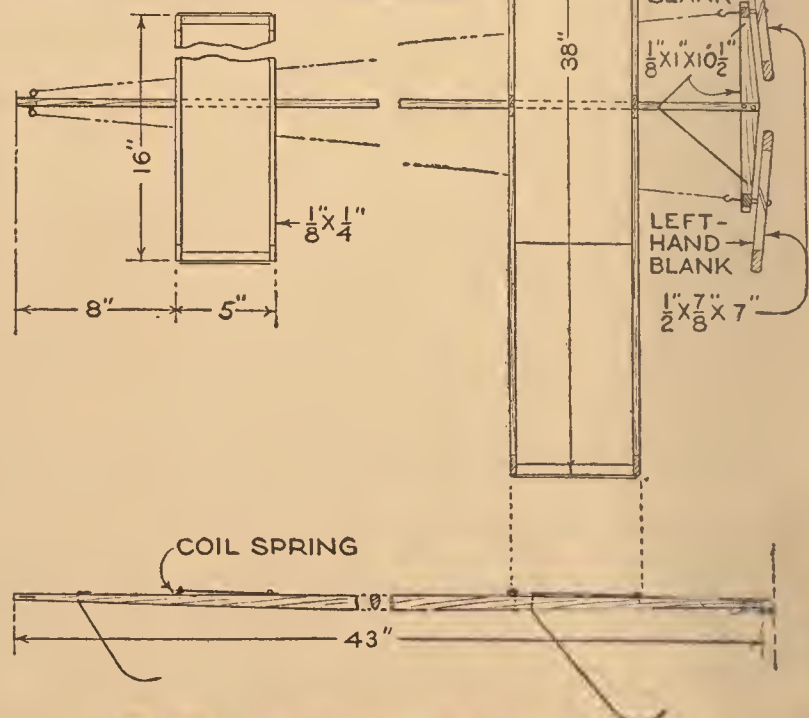


Fig. 10 TWIN-PUSHER TYPE

The Four Styles of Model Airplanes Illustrated have Proved Satisfactory in Flight, and Possess Features That Make Them Easy to Build. The Line of Flight and Altitude of the Models are Regulated by Adjusting the Wings and Elevators. The Driving Power is Furnished by Rubber Bands



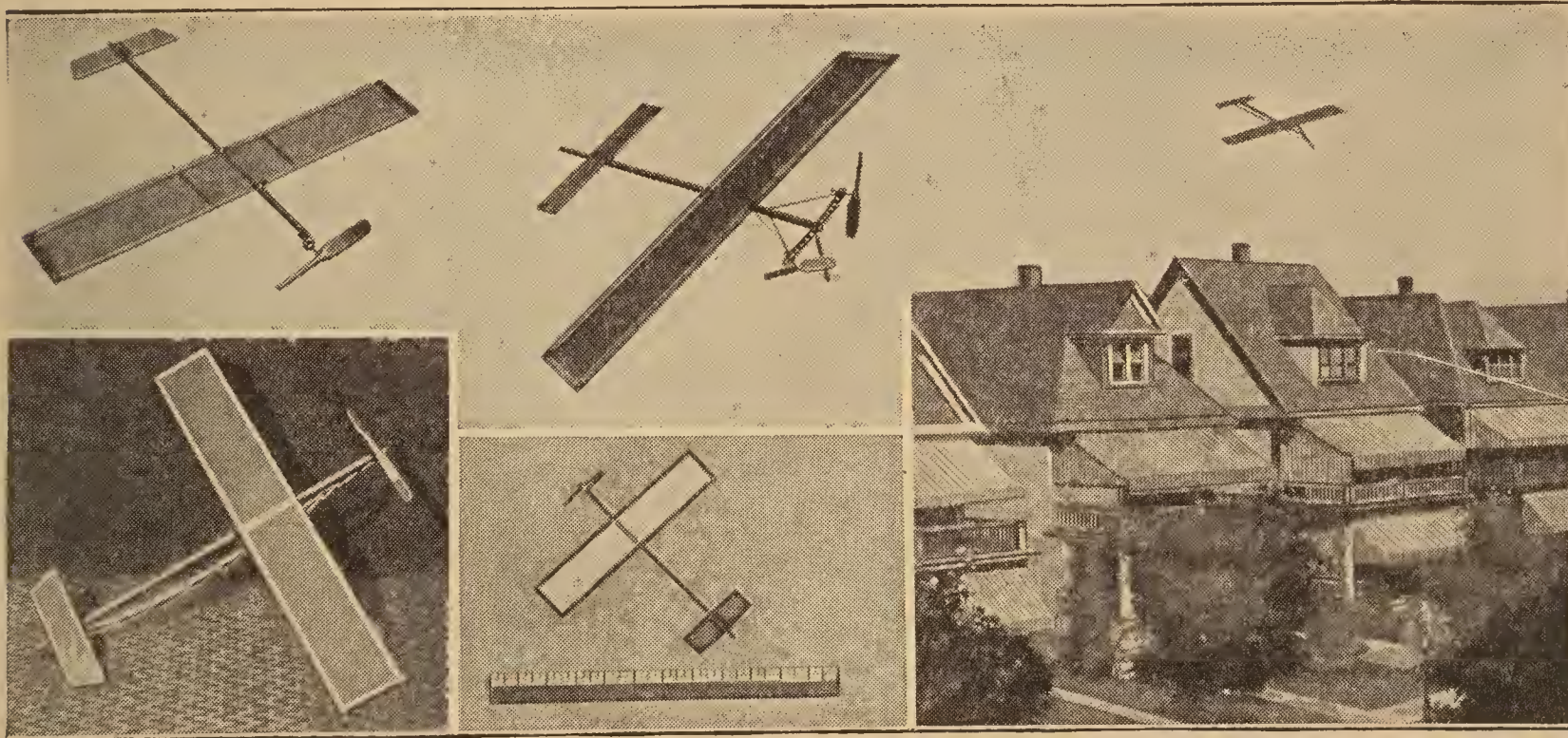
HOW TO BUILD MODEL AIRPLANES

By DONALD W. CLARK

THE model airplanes illustrated, while they do not exemplify the very best performance or design, nevertheless have proved to be very satisfactory in flight, and have structural features that make them easy to build. Because of this simplicity of design, they will appeal to the person who likes to build, whether he has had experience in this line or not, and there is little doubt of his ability to complete the style of his choice, provided he has the necessary patience and consideration for detail.

Since the "racer," Fig. 1, the "fly-about," Fig. 2, and the "rise-off-ground,"

and the middle of the spars, wrapping two or three thicknesses of paper around them; this is to prevent splitting. From a piece of soft wire, $\frac{1}{16}$ in. in diameter, cut a piece 1 in. longer than the distance between the centers of the spars, and bend right angles $\frac{1}{2}$ in. from each end. Flatten the ends of the wires on an anvil or vise, lay the spars flat on a smooth surface, and insert the short ends of the wires into the holes in the ends of the strips, forcing them in as far as they will go, as indicated in Fig. 5. When these wires are bent to control the direction of flight, they will stay so, because they are



Above, Left: The "Fly-About" Model Shown with Two Extra Wing Ribs; Center: The "Twin-Pusher" Type with a Cruising Radius of from 600 to 800 Feet. Below, Left: This View of the Fly-About Model Shows How the Motor is Assembled; Center: A Tiny Model Compared with a 12-Inch Rule; It is Driven by a Two-Inch Propeller. Right: One of the Model Planes in Flight

Fig. 9, types are nearly alike, they will be described first. The wings of all three are built up in the same manner, using materials of the same kind, but differing in their dimensions. To build the wings for either model, two strips of white pine, basswood, or spruce are selected, a trifle over the required length, planed down to measure exactly $\frac{1}{8}$ by $\frac{1}{4}$ in., and then cut to length. Mark the middle of the strips, and drill a $\frac{1}{16}$ -in. hole through each. In the center of each end of the strips drill a $\frac{1}{16}$ -in. hole $\frac{1}{2}$ in. deep. Next, cut several strips of tough paper 1 in. wide, coat them with glue, and bind each end

soft and because the flattened ends prevent them from moving up and down. This method bends the rear spar a little, but it has proved satisfactory on many models. After the wing frame has been assembled, lay it on a piece of tough paper, mark the outline, and then cut it out, leaving a $\frac{1}{2}$ -in. margin on all sides. Now coat the underside of the frame with glue, place it on the paper, having the margin even all around, and work out the wrinkles, being careful not to bow in the spars. Cut the ends of the paper to fit between the spars, coat them with glue, fold over the wires, and stick to the

top side of the paper. After the glue has dried thoroughly, lay the wing on a smooth board and trim off the surplus paper. Punch a hole through the paper binding over the holes in the spars, and give the whole a coat of waterproof varnish to make an exceedingly tough and durable unit.

For the motor bar, cut a piece of pine or spruce, $\frac{1}{4}$ by $\frac{3}{8}$ by $24\frac{1}{2}$ in. Lay it flat, drill a $\frac{1}{16}$ -in. hole about $\frac{3}{4}$ in. from one end, and another $\frac{1}{2}$ in. from the first. Bend a piece of soft wire as in Fig. 3, slip it through the holes, and bend the ends as shown. The propeller bearing on the racer is made from a piece of sheet metal, drilled for the $\frac{1}{16}$ -in. diameter shaft, and fastened to the bar as shown in Fig. 6, although it can be bound to the shaft with glued paper; the latter will, perhaps, be the better way for the beginner. Figure 7 shows how to make the propeller. The shaft should be made of wire, bent as shown in Fig. 1, and slipped through the hole drilled in the center of the propeller; by indenting the hub a little with the short end of the shaft, the exact position for the extra hole can be found. When this is drilled, slip the shaft through the hub again, pressing the short end into the extra hole; this prevents any chance of the propeller turning on its shaft. Another way is to flatten the end of the shaft and force the widened part into the wood, parallel with the grain.

The elevator, Fig. 4, is made of pine or basswood, bound in the middle with glued paper, as described for the wing spars and indicated by the shaded section in Fig. 1. Plane down the wood to $\frac{1}{16}$ in. in thickness, and cut a piece of the proper size; for the racer, it should measure $2\frac{1}{2}$ by 8 in., for the fly-about $2\frac{1}{2}$ by $8\frac{1}{2}$ in., and for the rise-off-ground model 3 by 9 in. Bind the edges with a strip of paper and varnish. The elevator of the racer is not movable, but is attached with two round-head screws to the motor bar. This makes it impossible to alter the angle of the elevator on this model without removing it from the bar. Two or three small washers underneath the forward edge serve to place it at the correct angle. On the fly-about and rise-off-ground models, however, the elevator is adjustable, and is fastened with but one screw near the rear edge, which serves as a pivot, and one rubber band; the latter holds the elevator down against a flat-headed screw located under the front edge, and also keeps it straight. To increase or decrease the angle of the eleva-

tor, merely turn it to one side, so that the hole shown in the drawing will come over the screw head. Then, with a small screwdriver, turn the screw in or out as needed, and allow the elevator to return to its normal position. The rubber band also prevents breaking of the elevator by absorbing some of the landing shock.

The rise-off-ground model, Fig. 9, is just like the fly-about, except that it has a little more surface than the latter, and the wing is set at an angle large enough to give it a good lift. This is done with small washers, or coiled wire of sufficient thickness to raise the front wing spar about $\frac{1}{8}$ in. The drawing shows how the landing gear, which consists of three wheels mounted on hard wire, is attached. Make the wheels of cigar-box wood, drill the centers, and use the same size of wire for the axles as for the wire supports, the ends of which should be looped around the axles. The small front wheel must be a little lower than the others, so that the forward end of the motor bar will be higher than the rear when the model is resting on the ground. The diameter of the front wheel is $1\frac{1}{2}$ in., and the larger ones are 2 in. in diameter.

The "twin pusher," Fig. 10, is more elaborate than the other three, but is not beyond the amateur's ability. Its elevator does not swing, but it is made in exactly the same manner as the other models. This is also true of the wing, except that in this case the spars are $\frac{3}{8}$ in. square in the middle, tapered down to $\frac{1}{8}$ by $\frac{3}{8}$ in. at their tips. Two extra wire ribs are placed 6 in. from the center, between the spars. The holes are drilled and the ribs inserted before the paper wing covering is applied. The motor bar is of pine or spruce, $\frac{1}{2}$ by 1 by 43 in., shaped as shown in the drawing. Make the front hook from a 4-in. length of wire, insert it in a small hole drilled near the front of the bar, and bend the loops. The crossbar that takes the bearings should be of ash or other hardwood, and be braced with $\frac{1}{16}$ -in. hard wire. The bearings are strips of sheet metal, bent to U-shape and riveted to the crossbar, and hard wire is used for the landing skids. The front edge of the wing should be raised about $\frac{1}{16}$ in. The elevator is adjustable, and is attached to the motor bar by two screws; the front one runs through a small coil spring between the spar and motor bar, and furnishes a means of changing the angle of the elevator.

The power on all these models is furnished by rubber bands, about $\frac{3}{64}$ in.

thick, $\frac{3}{16}$ in. wide, and 4 in. long, linked together chain fashion, so that three of the bands will only make a length of 6 in. instead of 12 in. This method allows broken bands to be replaced with new ones quickly and easily.

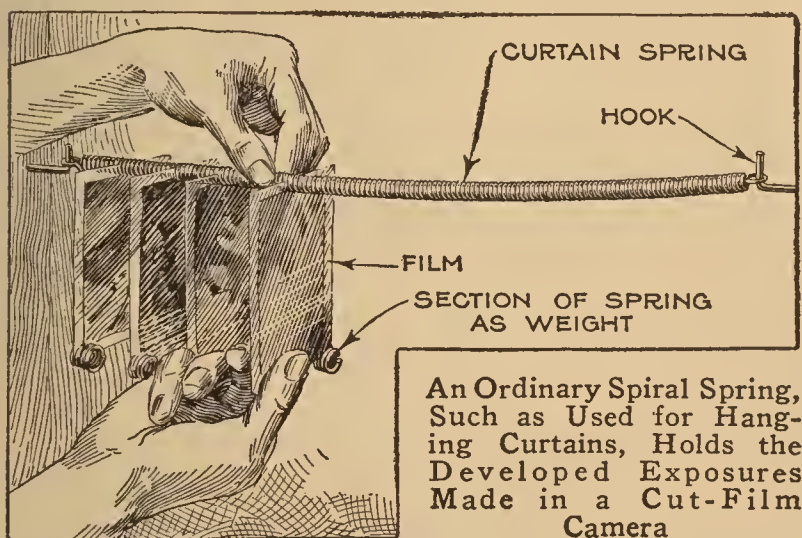
A wire hook, inserted in the chuck of a hand drill, as shown in Fig. 8, will serve as a winder. After linking the bands together on the model, release the front end of the "motor," and hook it to the drill. Stretch the rubber to about twice its length and turn until about half wound. Then keep turning, but gradually release the tension so that the rubber will be straight when fully wound, and hook on again. The number of turns needed will be found through experience; the twin model will stand more than 1,000 turns to each propeller, which means that with a

gear ratio of 4 to 1 on the drill, the handle will have to be turned 250 times. The two propellers on this model must revolve in opposite directions.

To launch, hold the motor bar with the right hand, just ahead of the wing, and the propeller with the left. Then, with a quick, upward push, send the airplane into the air. If it has a tendency to climb too steeply, the elevator should be lowered a little, and if it loses altitude, the elevator should be raised enough to correct this fault. With both wing tips flat, the planes will have a tendency to turn to the right. Curving the right-wing tip down a little will give a straightaway flight; a left turn can be made by curving the right tip down still more. Several trial flights will probably be necessary before the proper adjustment is obtained.

Simple Hanger for Cut Films

An ordinary coil spring, such as used for holding window curtains, can be made into a holder for developed exposures



from a film pack. The spring is suspended between two hooks, as shown. The films are inserted between the coils, the compression of the spring preventing them from slipping out. To prevent the cut films from curling, $\frac{1}{2}$ -in. sections of a larger and heavier spring may be slipped over the bottom to serve as weights.—W. W. Baumeister, Cambridge, Mass.

Registers Used as Ventilators

Adjustable steel hot-air registers can be used as a means of ventilating the garrets of houses having poor ventilation under the roof. They are very easily put up and are neat in appearance. An opening is cut in the gable end of the house and the register plates fitted and screwed to the siding.—Louis M. Steffen, Dayton, Ohio.

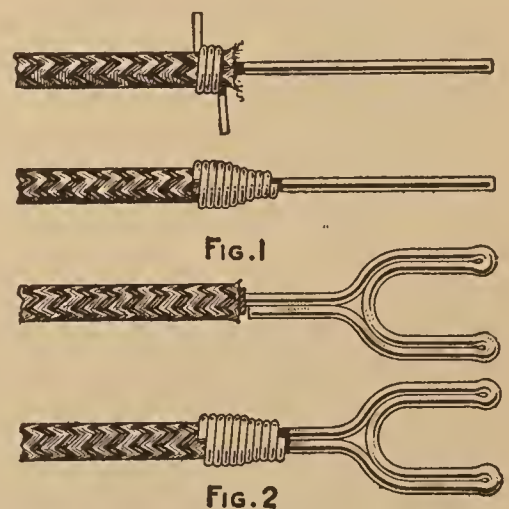
Testing for Leaky Tire Valves

Automobile tires, suspected of having a slow leak at the valve, can be tested without removing the tire from the rim. A convenient method for detecting such leaks consists in filling a small bottle with water and immersing the valve stem in it. The wheel having the suspected valve is turned so that the valve is at the top, and the valve stem is inserted into the neck of the bottle. Leaks will manifest themselves by a series of bubbles.

Neat Tips on Wires

In order to have the wiring look neat on a radio set, or other instrument being made, all wires with visible connection to binding posts

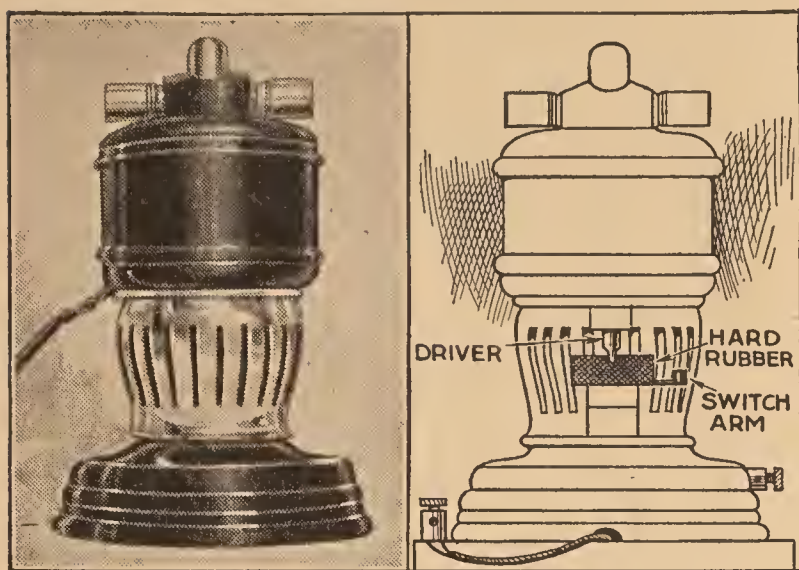
should be wound with small bare wire to prevent the insulation from raveling out. Fig. 1 shows the insulation removed from the wire, the winding of the tip started



with a piece of bare wire of small diameter, and the neat finished effect. Fig. 2 illustrates the method of making a tip for connecting to another style of binding post. The latter is a connection that is especially useful when the wire is to be frequently connected to or disconnected from a binding post.

A Neat Radio Interrupter

The radio interrupter illustrated is made from common materials and pre-



An Electrically Operated Interrupter for the Amateur Radio-Transmitting Set That is Made from an Electric Motor, the Metal Guard of an Old Casserole, and Miscellaneous Electrical Parts

sents a very attractive appearance when finished.

The base, made from a wood or hard-rubber fixture base, has mounted in its exact center a discarded switch arm, knob, and bearing, from which a wire connection runs to a binding post at the edge of the base. Soldered to the end of the switch arm, which clears the slotted metal guard by $\frac{1}{8}$ in., is a small piece of spring brass, about $\frac{1}{40}$ in. thick by $\frac{1}{4}$ in. wide. This is so arranged as to make and break contact with the small silverplated casserole guard, which is mounted between the motor and base, and to which a binding post is soldered for the second connection. The shaft of the small fan motor used is connected at the lower end to the knob of the rotating switch arm by means of a tube, forced over the shaft and flattened at the end. This end fits into a slot in the hard-rubber switch knob, so that there is no direct electrical connection between the switch and motor.

In case a device such as this is to be used on a high-voltage lighting or other circuit, it will be best to insulate the motor from the slotted casserole cover. This can be done by placing heavy-paper washers and bushings on the motor bolts. —R. U. Clark III, Newton, Mass.

Keeping Water Out of Automobile Casings

Automobile owners are frequently troubled by water in the tire casings, admitted through the opening for the valve stem. This water and the rust that results, cause much wear on the inner tube.

An excellent method of preventing this trouble is to cut several washers, about 2 in. in diameter, from an old inner tube. A small hole is cut in the center of each, so that it can just be forced over the valve stem, making a tight fit. When the rim is put in place on the wheel, the washers will be compressed in the space between the felly and rim, making it impossible for the water to enter.

An Improvised Dark Room

For changing plates, loading holders, and even developing negatives, when there is no dark room at hand, an ordinary coat and a wash boiler, box, or similar light-tight vessel, can be made to answer. The

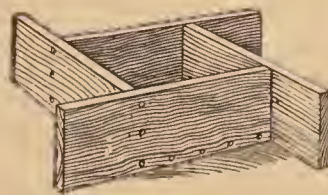
coat is buttoned up and the skirts are securely tied around the top of the wash boiler, in the cases shown in the photo, or the box, after the plates and holders and a small light-tight box have been put in. The operator



runs his arms down through the sleeves of the coat and changes the plate or removes exposed films from the film pack, placing them in the box. In the case of film packs, single films can be developed by placing them in a tumbler of developer that is mixed as for a tank; other tumblers are provided for clear water and for the fixing bath. —Hallie H. Holt, Salem, Ill.

Feed Box That will Not Overrun

It is frequently desired to have a feed or salt box in a feed lot or pasture. Some animals seem to delight in upsetting the usual type of box, but one made



according to the drawing, with the sides extending beyond the corners, will be proof against the mischievous antics of the stock.

The pieces for the box are cut just twice the length required for the actual dimensions of the box.



Homemade Greeting Cards

By W. C. HARRIS

IF one wishes to get away from hackneyed printed or engraved greeting cards during the holiday season, it is a comparatively simple matter to make most attractive cards by photography.

The first step, if elaborate cards are to be made, is to build up the "dummy." The negative, or a finished print, is laid on a sheet of drawing paper and a layout of the lettering, etc.,

is made around it. The lettering, monograms, etc., that are to appear on the design may be drawn on separate pieces, and the whole arranged to best advantage around the photo. When the desired arrangement is completed, the loose parts are inked in, stuck down on the bristol board together with the print, and a negative made of the whole layout. This is used to print the greeting



Left: Greeting Card with White Letters, Made by In on Enlargement. Right: Letters Printed in Black by Double Printing. Below: A "Dummy," from Which Large-Sized Cards are Made

cards. If the lettering is to appear on the print itself, an enlargement, of reasonable size, is made on a good smooth-finish paper, upon which the lettering is inked, making the sentiment expressed suit the picture used, as shown in the illustrations. From this, a copy negative, the exact size of the desired card, is taken, and contact prints made. These should be mounted on rough cover paper, contrasting in color with the print.

The lettering may be printed in white through some thin part of the original negative, by making a positive of the lettering, on commercial film, and then laying it over the picture negative so that the lettering comes in the proper position. It is necessary to make the posi-

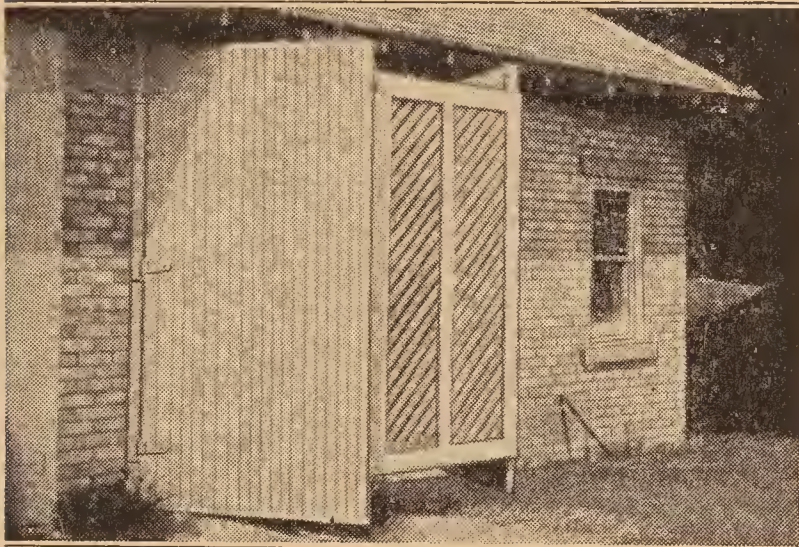
tive film larger than the negative, so that no edge may show in the finished print, and to keep it all clear except for the letters, by masking the negative from which it is printed. The letter positive and picture negative are bound together, and the cards printed through both.

It is best to make the card prints on double-weight, linen-finish buff or white paper, and it is well to make the prints to suit a particular size of envelope, as it is usually easier to do this than to find an envelope to suit the print.

Should any difficulty be encountered in making the prints stay flat, it may be overcome by dampening the backs, and putting them between blotters, under a weight, and allowing them to dry.

Ventilating Doors for Garage

The garage doors shown in the illustration are somewhat unusual in that a lattice gate is hinged to the edge of one



A Lattice Gate, Hinged to One Garage Door and Hooked to the Other, Keeps Undesirables Away When the Owner is Working on the Car

door, and, when the doors are opened, may be hooked to the edge of the other.

This gate is made of wood strips, set in a light frame at an angle of 45°. When the doors are shut, or opened full, the gate is folded back against the door to which it is hinged. This arrangement admits plenty of light and air while working on the car, and at the same time prevents the entrance of unwelcome visitors.

Renewing a Radio Crystal

When the galena crystal of a small radio set has become dull and dirty, so that it is almost impossible to find a sensitive spot, a simple but very effective method can be used to renew it.

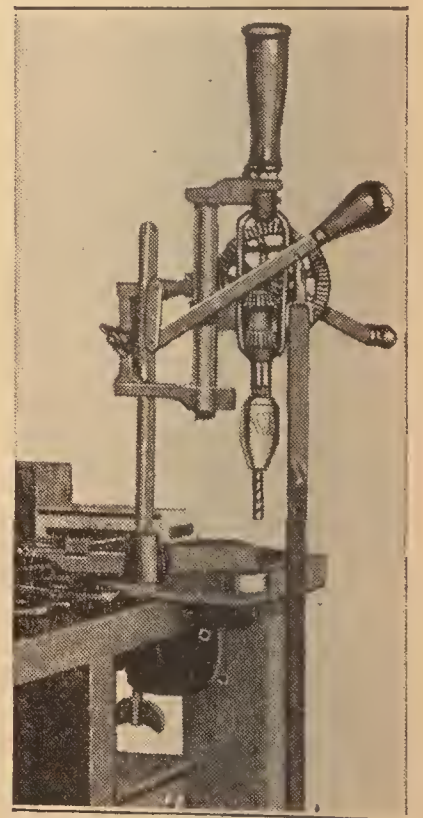
The mounted crystal should be held over a flame, in an old spoon, until the

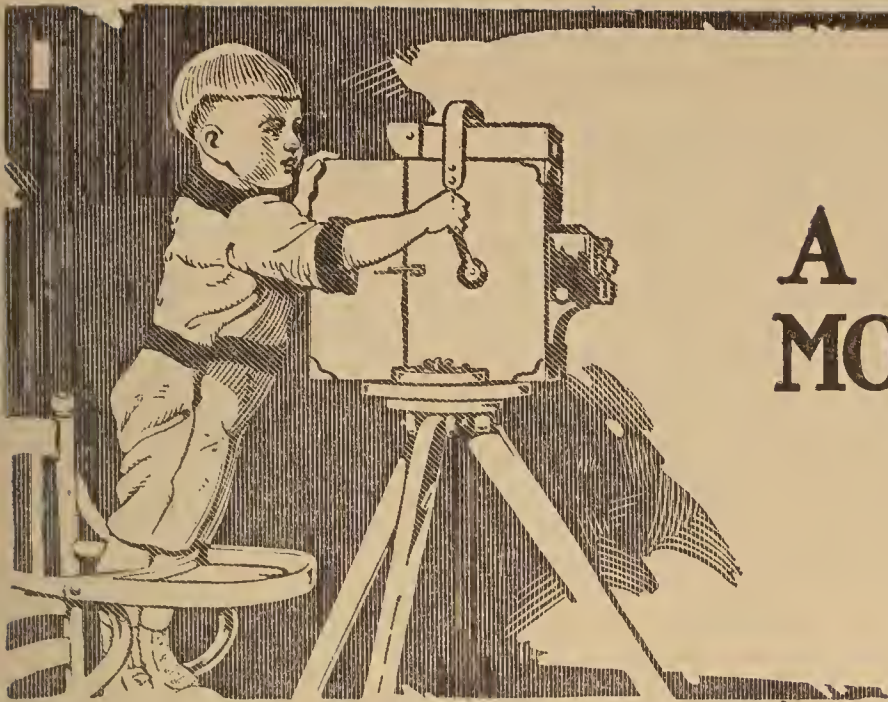
metal begins to run. The crystal can then be turned over with a piece of wire, thus exposing an entirely new sensitive area. A mold can be used to keep the melted metal in the original shape and size, so that it will fit in the detector cup. Care should be taken not to heat the metal too much beyond the melting point, as this will impair the sensitiveness of the crystal.

Improving the Hand Drill Press

The photograph shows a method by which a small hand drill press can be more conveniently operated. With the

drill press as bought, a clamp is provided for holding the work, as it is necessary to use both hands, one to turn the crank and the other to feed the drill by pressure on the lever. By drilling a hole in the feed lever and attaching a strap, or chain, running from the lever to a pedal on the floor, the necessary pressure of the drill against the work is obtained by pressing on the pedal. This makes it unnecessary to clamp the work, except in special cases, and leaves one hand free to hold it while the other is used to turn the drill.—C. R. Gains, Colfax, Ia.





A HOMEMADE MOTION-PICTURE CAMERA

By R.E. Best

THE making of a moving-picture camera and projecting apparatus that will do work quite favorably comparable with that of high-priced machines, is not so difficult an undertaking as might at first appear, nor does it involve great expense. By the use of ordinary tools, the expenditure of a little time, and by careful work, a very satisfactory piece of apparatus may be produced.

The camera here described uses standard motion-picture film, and will contain 100 ft. at one loading. The magazine can be removed and the camera itself used to project the pictures, which will be found to be practically as satisfactory as the use of a separate projector. The dimensions are taken from a camera made by the author;

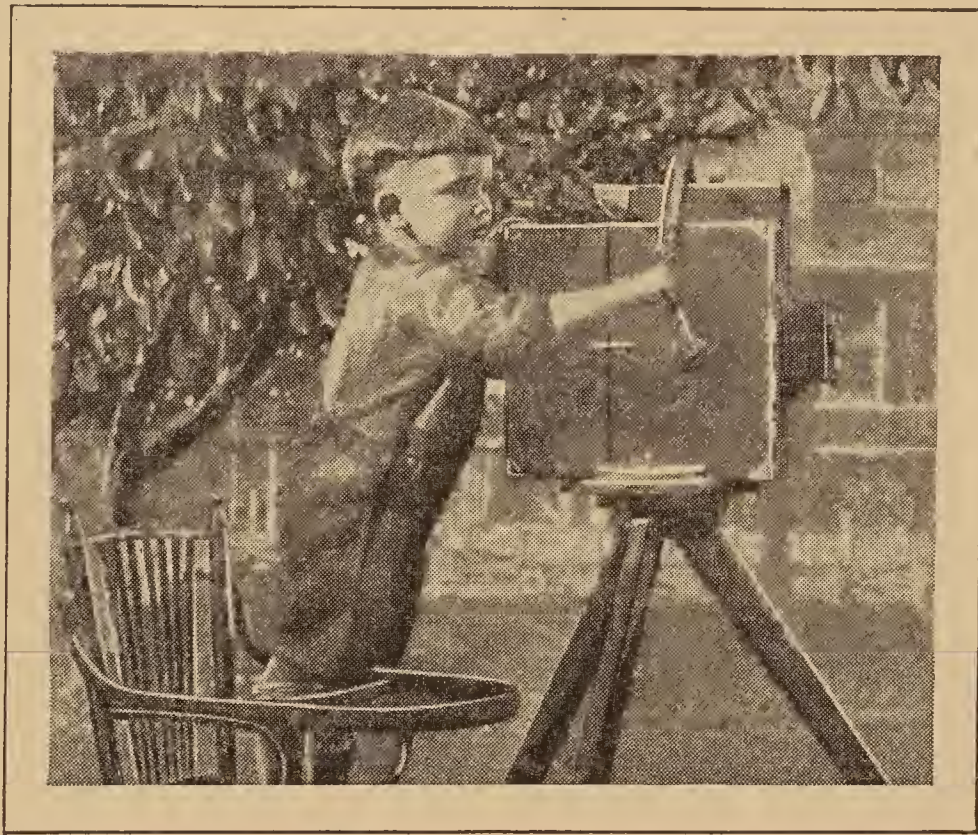
a slight variation may in some cases be necessary, depending on the material used, and the focal length of the lens.

Standard motion-picture film is $1\frac{3}{8}$ in. wide, and perforated on both edges. The pictures are 1 by $\frac{3}{4}$ in., and there are 16 pictures to the foot. The film must be moved past the lens with an intermittent motion at the rate of a foot a second. A rotary shutter is provided to cut off the light when the film is moving, in order to avoid blurring the pictures. There are several ways in which this intermittent motion may be produced, but

the one described will be found the most practical for amateur construction.

The lens can be borrowed from an ordinary camera. Since the pictures are of such small size, the lens must be of short focal length, preferably from $2\frac{1}{2}$ to 4 in. A combination of two lenses of 6 or 7-in. focal length will give the desired result. The box is best made of

maple about $\frac{1}{4}$ in. thick, although any thin close-grained boards will do. The joints should be mortised, as shown in the illustrations, to prevent any possibility of light leakage. The gears can be obtained for a modest sum from any house selling standard gears. The sprockets can be made by one who has access to a lathe, but it is



The Finished Camera Set Up and in Operation: Note the Heavy Tripod, Which Is Necessary to Insure Steady, Even Pictures

better to buy them from a motion-picture supply house. The other materials can be obtained from any hardware dealer.

The following materials will be needed:

- 1 6-in. gear, 32-pitch.
- 2 3-in. gears, 32-pitch.
- 1 $\frac{3}{4}$ -in. gear, 32-pitch.
- 1 pair bevel gears, $\frac{1}{2}$ by 2 in.; that is, ratio 1 to 4.
- 2 standard motion-picture sprockets, 16-tooth, with idlers.
- 1 $\frac{1}{4}$ -in. gear, 48-pitch.
- 1 rack, 6 in. long, $\frac{1}{8}$ in. square, 48-pitch.
- 1 bushing, $\frac{5}{16}$ -in. inner, and $\frac{3}{8}$ -in. outer diameter.
- 3 lb. babbitt.
- Brass rod, $\frac{5}{16}$ in., $\frac{1}{4}$ in., $\frac{3}{16}$ in., and $\frac{1}{8}$ in. in diameter.

First make the box, 12 by 7 in. inside dimensions, the front portion containing the mechanism to be $7\frac{3}{4}$ in. deep and the rear portion, or magazine, 5 in. deep. One side of the front portion should extend 2 in. above the top of the box to form one side of the finder. A groove, $\frac{1}{8}$ in. deep and $\frac{1}{2}$ in. wide, should be cut in the top and bottom of the front, $2\frac{1}{4}$ in. from the right side, looking from the back, before the box is assembled, to allow the plate that holds the gears, sprockets, etc., to slip in and out. A rectangular hole, $3\frac{1}{2}$ by $4\frac{1}{8}$ in., is cut in the front to allow the focusing device to be set in, and an opening for the inspection door in the left side. All joints should be glued and made light-tight. The rear portion should have a $\frac{3}{4}$ -in. strip set around the inside to project about $\frac{1}{4}$ in., so that when the two parts of the box are brought together, this strip will come inside the front and back portions, and make the joint light-tight. It would be well to face the edge of the box with felt.

Set the lens in the front of a box, constructed of $\frac{1}{4}$ -in. material, 3 by $3\frac{5}{8}$ in. by $1\frac{1}{2}$ in. in outside dimensions. The bottom edge of this box should extend about $\frac{1}{8}$ in. beyond the sides. A piece of the 48-pitch rack, $\frac{1}{8}$ in. square and $1\frac{1}{2}$ in. long, should be set flush in the center of the bottom. This box should slide quite easily in a $3\frac{1}{2}$ by $3\frac{1}{2}$ by $4\frac{1}{8}$ -in. box which is set in the front of the camera. The base of this outside box is bored in the center to take the pinion, and a hole drilled at right angles to this for the pinion shaft; grooves are also cut in the sides to fit the projecting bottom of the box holding the lens. The box should have a block, $2\frac{3}{4}$ by $2\frac{1}{4}$ by $1\frac{1}{4}$ in., bored with a hole somewhat larger than the outside diameter of the lens, fastened to the inside of the back. This block should be fitted so that the box containing the lens will not bind in sliding back and forth. The back of the outside box should have a hole cut in it, of sufficient size to let the light from the lens fall on the film in the film gate, yet small enough to keep the light from spreading over other parts of the camera.

The pinion can be made by soldering a $\frac{1}{4}$ -in., 48-pitch gear to one end of a short piece of $\frac{1}{8}$ -in. brass rod. If a knurled brass button for the other end cannot be obtained, a button can easily be cast from babbitt.

This arrangement will be found to permit the lens to move quite freely in focusing and will admit no light to the camera except through the lens. When the cam-

era is complete, the proper position of the lens for objects at various distances can be determined by trial, and the positions marked.

The gears, sprockets, film gate, striker, shutter, etc., are all supported by one piece or plate which can be removed from the box as a unit. Make this plate of $\frac{1}{2}$ -in. hardwood, $12\frac{1}{4}$ by 6 in. Fit it to slide in the grooves in the camera box, where it can be fastened in place with screws when the mechanism is finished. Another plate of the same material, $11\frac{3}{4}$ by 6 in., should be fastened to the first by means of blocks, separating the two plates $1\frac{5}{8}$ in. The blocks must be located carefully, to avoid interference with the gears, and held in place by screws. Mark out the location of the four shafts, and bore holes in both plates, $\frac{1}{2}$ in. or larger in diameter. Make bearings of babbitt or heavy brass, bored to the size of the shaft and shaped so they can be fastened to the wooden plates by means of screws. These bearings can be moved until the gears mesh properly before they are permanently fastened in place.

The shaft to which the crank is attached should be of $\frac{5}{16}$ -in. brass rod. This shaft carries the 6-in. gear and the 2-in. bevel gear, and extends outside the camera to take the crank.

The crank should be turned at the rate of two turns a second, and, as the sprockets have 16 teeth, representing 3 in. of film, or four pictures to the turn, the sprocket shafts should turn twice as fast as the crankshaft in order to feed the film at the rate of 16 pictures a second. These two shafts are $\frac{1}{4}$ -in. brass rod and carry 3-in. gears. The lower shaft should have a 2-in. pulley placed between the sprocket and the bearing plate to drive a round belt running to the take-up reel. This pulley can be easily made of two circular pieces of cigar-box wood, glued together and grooved.

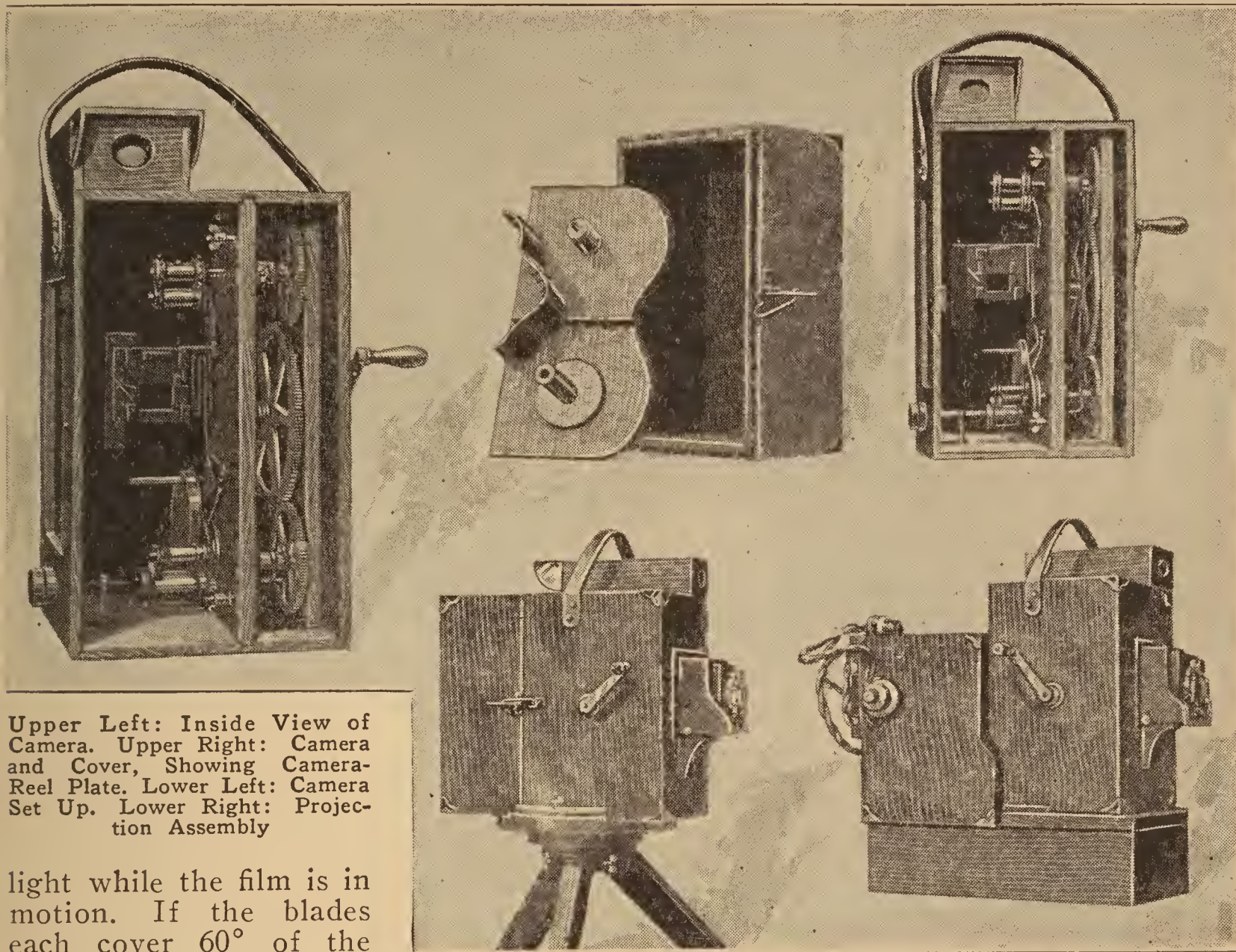
A $\frac{3}{16}$ -in. hole should be bored in the edge of the bearing plate for the shutter shaft, and the plate must be cut away in the center to allow the $\frac{1}{2}$ -in. bevel gear attached to this shaft to mesh with the 2-in. bevel gear on the crankshaft. The hubs of all the gears should be fitted with setscrews, and it is well to file flats on the shafts under these screws to prevent slipping.

The idlers should be attached to strips of heavy sheet brass and placed against the sprockets in the position shown. The strips should be pivoted at one end on a screw, and held in place with small coil springs.

The shutter should be cut from a 4-in. disk of sheet brass, bored with a $\frac{1}{8}$ -in. hole in the center and soldered to the end of the shaft, which should be shouldered to fit the hole. It must be designed in such a manner that it will shut off the

small pieces to the back. It is quite important that the wheel be balanced to prevent vibration, which produces unsteady pictures.

The film must be held stationary and perfectly flat when the exposure is made.



Upper Left: Inside View of Camera. Upper Right: Camera and Cover, Showing Camera-Reel Plate. Lower Left: Camera Set Up. Lower Right: Projection Assembly

light while the film is in motion. If the blades each cover 60° of the circle they will be found to be sufficiently large. The shutter has two blades and consequently should turn four times as fast as the crankshaft.

The striker serves not only to pull the film down through the film gate as it is taken up by the lower sprocket, but acts also as a flywheel. For this reason it should be heavy and well-balanced. It should be $2\frac{3}{4}$ in. in diameter, by $\frac{3}{8}$ in. thick, and may be cast from babbitt in a wooden mold (do not use pine or any wood containing pitch for molds). The arm that comes in contact with the film may be made of sheet brass, and soldered to the edge of the wheel. It should be filed away slightly in the middle for a distance of 1 in. so that it will only come in contact with the edges of the film and not scratch the pictures. After the striker has been bored and fitted to the end of its $\frac{3}{16}$ -in. shaft, it should be trued up on a lathe if one is available, and carefully balanced by boring holes or soldering

It must also be allowed to move quite easily when pulled down by the striker. This is done by means of the film-gate assembly, which consists of three parts: the film gate, cast in babbitt, the pressure plate, and the cover, made of heavy sheet brass. The film gate is fastened rigidly to the main bearing plate by means of screws; the pressure plate holds the film against it and is allowed to give slightly as the film moves through. One edge of the cover fits into a groove or notch in the film gate, and the other edge is held down by means of a thumbscrew.

It requires a little ingenuity to build the mold to cast the film gate, but by combining blocks of wood of the proper size and shape, a mold can be built up which will make a very nice casting. When the casting is finished, smooth it up with a file and cut a groove in the base with a hacksaw for the edge of the cover. The surface around the "frame"

and along the edges of the passageway for the film must be carefully smoothed, as these parts come in contact with the film, which is very easily scratched. The rectangular hole, or frame, should be 1 in. by a little less than $\frac{3}{4}$ in., to avoid any overlapping of pictures.

The pressure plate should fit quite loosely in the film passageway in the film gate. Its upper edge is curved to avoid scratching the film, and it is fitted with four short posts of $\frac{1}{8}$ -in. brass rod, which reach through the cover and come in contact with flat springs. These springs keep the pressure plate tightly against the film, yet allow it to give when uneven parts of the film, such as splices, come through. The frame for the picture is cut through both the cover and pressure plate as well as the film gate, to allow the light to go through in projecting the pictures. The side of the pressure plate which comes in contact with the film should be highly polished to avoid any possibility of scratching the film.

The cover consists of a piece of sheet brass to which are attached the springs that hold the pressure plate against the film. These springs are pieces of watch spring, supported in the center and inclosed at each end. The center supports can be cut from sheet brass and soldered in place. The little boxes inclosing the ends of the springs can also be made of sheet brass, and soldered to the cover. This arrangement will be found to hold the springs in their proper place without the necessity of boring the hard steel. The springs must be bent until they put the proper pressure on the film; this will have to be determined by experiment.

Build a box, 2 by $2\frac{1}{2}$ by 8 in. inside dimensions, on top of the main camera box, to inclose the finder. Fasten a small double-convex lens of 5 or 6-in. focal length in the front of this finder, and leave a hole, about 1 in. in diameter, behind the lens to admit light. A lens suitable for this purpose can be obtained from any optician or may be taken from an old bicycle lamp or flashlight. The screen for the finder can be made by removing the emulsion from a piece of film and roughening it with fine sandpaper. It should be placed in the finder at the focal distance of the lens. When the camera is all complete and assembled, a black border should be painted on the screen to allow only those parts of the image to show that are thrown on the film in the frame by the main lens. The back of the finder should be inclosed to shut out the light, and a peephole, about

1 in. across, should be cut in it. A brass hood will add to the appearance and allow the finder to be closed when not in use.

The camera is now ready to assemble. Fasten the film gate to the bearing plate in such a position that the frame will come directly behind the lens, and at such a distance that the range of the focusing device will permit objects at any distance to be focused on the film. Put in all the shafts, gears, sprockets, etc., attach the crank, and adjust the bearings until all the gears mesh properly and run smoothly.

Now remove the crank and crankshaft, insert the bearing plate in the camera box, and fasten it in place by screws at top and bottom. Locate the position of the crankshaft on the side of the camera, and bore a hole somewhat larger than the shaft. Cast a circular piece of babbitt, 1 in. in diameter and $\frac{3}{16}$ in. thick, and bore a $\frac{5}{16}$ -in. hole in the center. This is placed on the outside of the box, the shaft inserted, and the gears set in place. The circular piece of babbitt can then be fastened to the outside of the camera by means of screws, to act as a bearing and prevent the leakage of light around the shaft. The shutter should be properly timed when the bevel gears are meshed.

A 6 by 11 by $\frac{3}{16}$ -in. plate should be fastened to the back of the main bearing plate for the purpose of holding the supply and take-up reels. Thumbscrews should be used for this purpose, as the plate must be easily removable when the camera is used for projection purposes. The pulley on the take-up reel must, of course, line up with that on the shaft in the camera, and a small belt be fitted.

The fastenings that hold the cover should be designed to pull the two parts of the camera tightly together. Fasteners can be made of heavy wire and small pieces of strap iron, as shown in the illustration. The tripod must be of heavy construction and quite rigid, as a wobbly tripod will produce jerky, unsteady pictures.

By removing the plate holding the supply and take-up reels, the camera can be used for the projection of the finished film, and if the work has been carefully done, the resulting picture will be as clear and steady as those made by professional apparatus. The best light for home use is a 250-watt stereopticon lamp, set behind a pair of condenser lenses. These can be taken from a stereopticon, or purchased at the optician's. The box must be well ventilated, and should be

lined with asbestos, as it gets very hot if used for any length of time. A supply reel and a take-up reel must be arranged, and the latter can be run by a belt from the pulley in the camera.

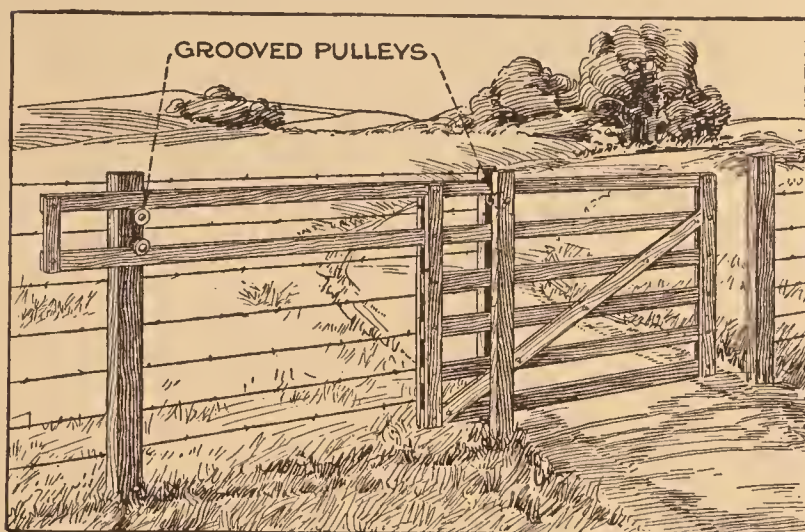
If one expects to develop and finish the film in his own dark room, some sort of apparatus must be constructed to handle the wet film. In handling small quantities, of 50 ft. or less, the most economical way is to construct a cylindrical reel 15 to 24 in. in diameter and about 2 ft. long. Let this rest in a frame so that, as it turns, it dips into a pan containing

the chemical. The film can be wound on the reel, emulsion side out, and passed through the successive baths of water, developer, and hypo, and then dried without being disturbed.

When the negative film is developed and dried, it must be printed on positive film before being projected. It can be printed in the camera by running the positive and negative films through together past a light, but it will be found more economical to send the negative to a laboratory, where the printing will be satisfactorily done for a few cents a foot.

A Practical Sliding Gate

The sliding gate shown in the drawing has decided advantages over many styles



A Type of Sliding Gate Which Is Neat in Appearance and Easy to Handle, as There Is Very Little Friction in the Parts

of similar gates now in use. It is neat in appearance and easy to open and close, as there is very little friction.

If a clear 10-ft. opening is desired, the posts on each side of the driveway should be about 11 ft. apart. One gatepost is made double to prevent the gate from being dislodged, and has a pulley in the center, to carry the top bar of the gate. Both upper bars are 22 ft. long and extend to another post, placed 11 ft. from the double one, where they are held in place by two grooved pulleys, as shown. A crosspiece must also be provided on the gate to prevent it from sagging.

An Improvised Developing Tray

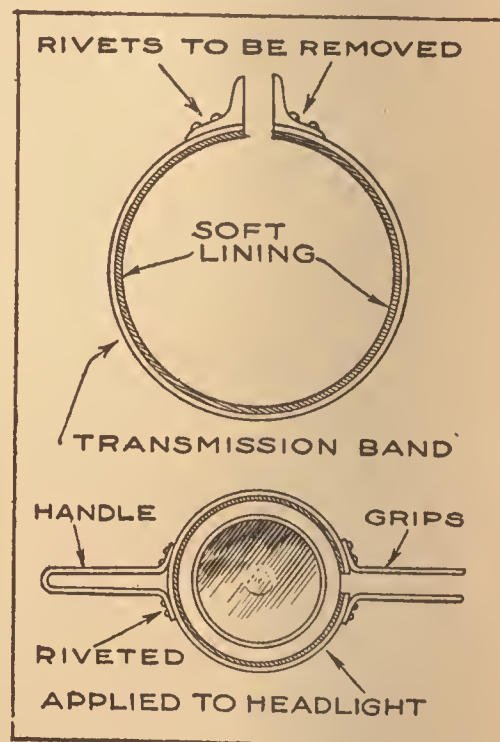
A photographer, having broken one of his glass developing trays, and being unable to obtain another immediately, made a tray of paraffin to serve as a temporary substitute.

After melting about a pound of paraffin, it was poured into a large pan of hot

water, until the layer of paraffin floating on the surface was about $\frac{1}{4}$ in. thick. When the paraffin had cooled down until it was fairly hard but still pliable, it was removed and pressed into a glass developing tray, the inside of which had been moistened with water to prevent the paraffin from adhering to it. The surface of the layer of paraffin was smoothed, and the edge cut even with the glass edge. After hardening, the paraffin was removed and found to form a serviceable tray that could be cleaned very easily and was not affected by the chemicals.

Tool for Removing Headlamp Rims

The removal of the bayonet-lock type of headlamp rim is one of the stubborn jobs that tries the patience and skill of practically every auto repairman or service man. The drawing shows a tool by means of which the rim is gripped with a uniform pressure at all points, and it is only necessary to grip and turn the handles to loosen even a tightly "frozen" rim, without damage. The tool is made from the transmission band of a light automobile, and fitted with a new, soft, white lining. The ears of the band are knocked off and their place taken by a pair of flat-iron grips, and on the opposite side of the band a handle is riveted.





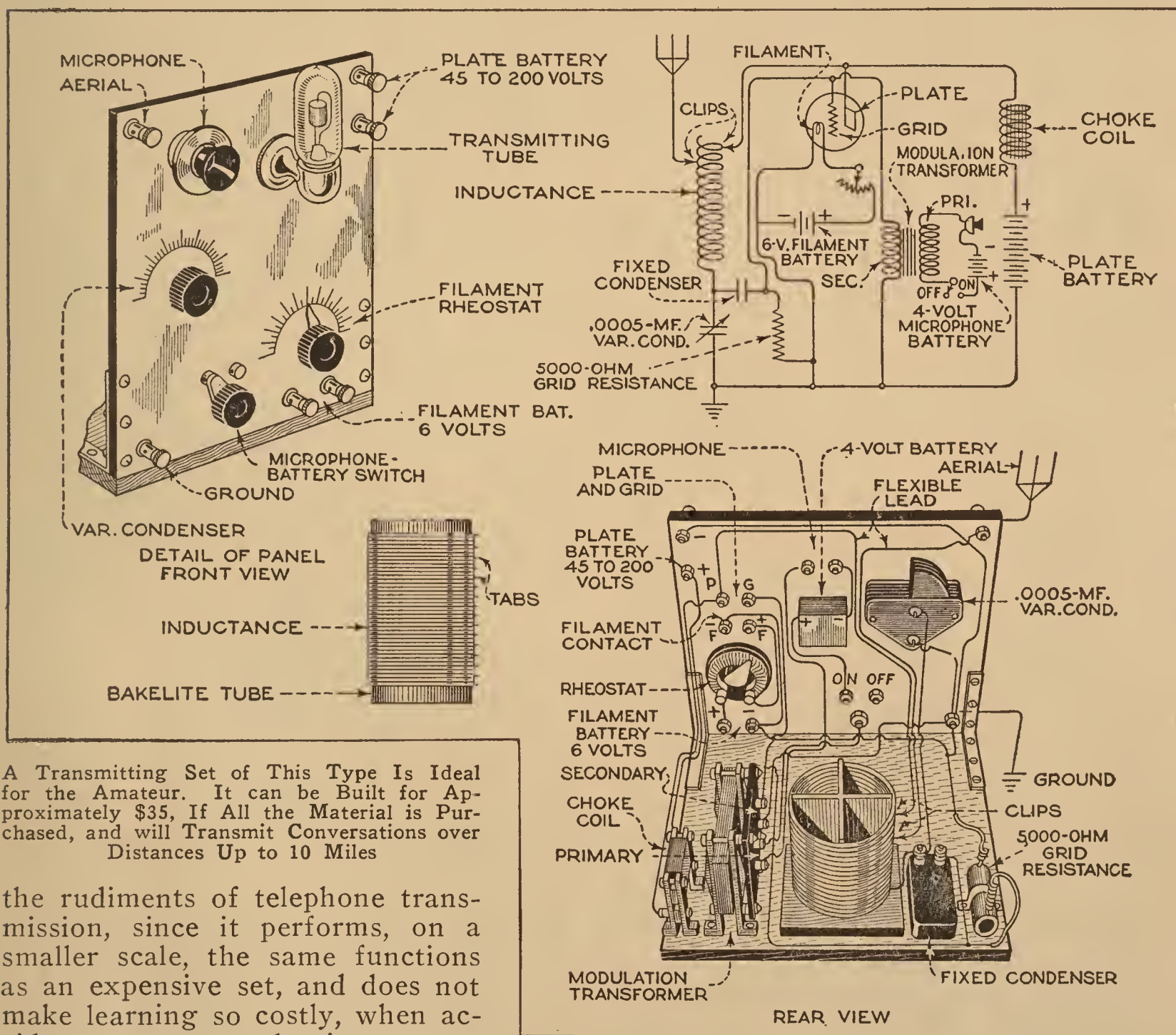
A SIMPLE BATTERY RADIOPHONE

By F. L. BRITTIN

AN experimental radiophone transmitter, operated on dry cells and a storage battery, can be built for approximately \$35, if all the parts are purchased; this does not include the cost of the batteries, and can be reduced somewhat by using homemade parts. With an instrument of this type, conversation can be carried on over distances up to 10 miles. This is the type of radiophone the amateur should build while learning

parts of this set, such as the inductance, the fixed and variable condensers, the transmitting tube, choke coil, modulation transformer, microphone, and the resistances.

The panel, which is made of 1/4-in. bakelite, is 10 by 12 in. in size, and is attached to the 3/4 by 8 by 10-in. wooden base by means of angle brackets. The binding posts for the batteries, aerial, and ground are arranged on the front of



A Transmitting Set of This Type Is Ideal for the Amateur. It can be Built for Approximately \$35, If All the Material is Purchased, and will Transmit Conversations over Distances Up to 10 Miles

the rudiments of telephone transmission, since it performs, on a smaller scale, the same functions as an expensive set, and does not make learning so costly, when accidents occur to the instrument.

Before attempting to construct this set, the reader should study the wiring diagram carefully, and should, at least in a general way, understand the principles involved in radiophone work, besides knowing the functions of the various

the bakelite panel, as shown in the drawing. The inductance is wound on a threaded bakelite tube, 4 1/2 in. in diameter and 7 in. long. If not already threaded when purchased, the tube should be put on the lathe and threaded, so that it will take

80 turns of stranded "litzendraht" wire, or the same amount of No. 16 bare copper wire, if the former is not available. At every five turns, a small tab of sheet copper is soldered to the wire, so that the clips of the aerial and plate can be snapped on at different points, to vary the inductance.

The lower end of the inductance coil is connected to one terminal of the variable condenser and also to the fixed condenser. The other terminal of the variable condenser is connected to the ground post. The second terminal of the fixed condenser is connected to three points: to the grid, to one terminal of the secondary coil of the modulation transformer, and to the grid resistance. The remaining terminals of the secondary coil of the transformer and the grid resistance are connected to the ground.

The six-volt storage battery is connected to the filament, care being taken to connect the negative terminal directly to the filament binding post, and the positive terminal to the filament rheostat. The negative terminal must also be connected to the ground.

The B-battery consists of at least four 22½-volt units, such as used for receiving sets. Several units can be used, as the greater the voltage supplied to the plate, the greater the distance spanned by the message. For this reason the plates on transmitting tubes are designed to stand high voltages, as high as 500 volts for the 5-watt size used in this set. The units are connected in series, the negative terminal being connected to the

ground line, while the positive lead passes through the choke coil to the plate, and also to the inductance coil, to which it is attached by means of a helix clip.

The simple matter of connecting the microphone circuit remains. This is done by placing a 4-volt battery, consisting of 3 dry cells, an on-and-off switch, the microphone, and the primary coil of the transformer in series on a separate circuit, as shown.

The variable condenser used is of .0005-mf. capacity, panel-mounting type, and should be able to stand a high voltage. A stop should be used to prevent it from shorting at 90°, as some condensers on the market are designed to do.

The fixed condenser is also of .0005-mf. capacity, especially designed for high voltage. The type used consists of several strips of copper foil between mica, the whole being bolted between two metal plates.

The 5,000-ohm grid resistance is of standard vitrified type. The filament rheostat is of 7 ohms' resistance. The choke coil is of the 150-milliamper type. If the builder desires, he may use an anti-capacity switch in the B-battery circuit, to permit throwing the battery current from the transmitting to the receiving set. The latter, of course, is a separate instrument.

It should also be kept in mind while wiring, that, although the wires are shown running parallel in the diagrams, for the sake of simplicity, they should be kept at right angles to each other as much as possible, in order to reduce induction.

LIST OF MATERIALS

1 ¼ by 10 by 12-in. bakelite panel.
1 ¾ by 8 by 10-in. wood base.
2 6 by 6-in. angle brackets.
6 binding posts.
1 filament rheostat.
4 contact points.
2 switch levers, with knobs.
1 .0005-mf. variable condenser.
1 .0005-mf. fixed condenser, C. W.-
type, for high voltage.
1 microphone.

1 5-watt transmitting tube.
1 4½ by 7-in. bakelite tube.
1 5,000-ohm vitrified resistance unit.
1 modulation transformer.
1 6-volt storage battery.
3 dry cells.
4 22½-volt B-batteries.
1 150-milliamper standard choke coil.
3 helix clips.
Litzendraht wire for inductance, or No.
16 copper wire.

1 tube socket, for panel mounting.

Useful Hints for the Motorist

A blow-out patch in an automobile casing will last much longer if a piece of old inner tube is cut and laid between the patch and the inside of the casing. This will prevent the ragged edge of the hole in the casing from wearing through the patch.

The solderless connections that hold

the flexible copper tubing to the gasoline tank and carburetor, often have a tendency to work loose, owing to the constant vibration. By substituting a piece of graphited asbestos-cord packing, such as is used to pack water-pump glands, for the slip ring, it will be found that the joint will not leak, nor will it work loose as quickly as before.—Wm. Byers, Kansas City, Mo.

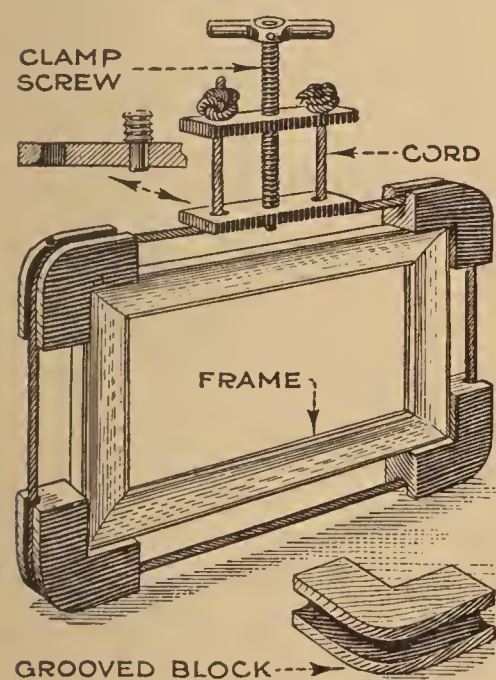
Simple Method of Making Candles

Very serviceable candles, that produce a flame four or five times as large as that of an ordinary wick candle, can be made in the following manner: About 1 lb. of paraffin—such as is used for canning purposes—is melted in a flat pan. A long sheet of tissue paper, about 6 in. wide, is grasped at each end, and is slowly passed through the melted wax several times, each layer being allowed to cool before the paper is passed through again. When the thickness of the wax is about $\frac{1}{8}$ in., the sheet is allowed to cool, and is then cut into pieces from 6 to 12 in. long, depending upon the size of candle desired, and rolled into cylinders.

When dipping, the wax should not be too hot, as it would then melt the layers previously applied, instead of adding a new one. It is best to melt the wax over water, at a temperature of about 212° F. To expose the paper wick for lighting, revolve the end of the candle in a flame until some of the paper lights; it is then ready for use.

A Simple Picture-Frame Clamp

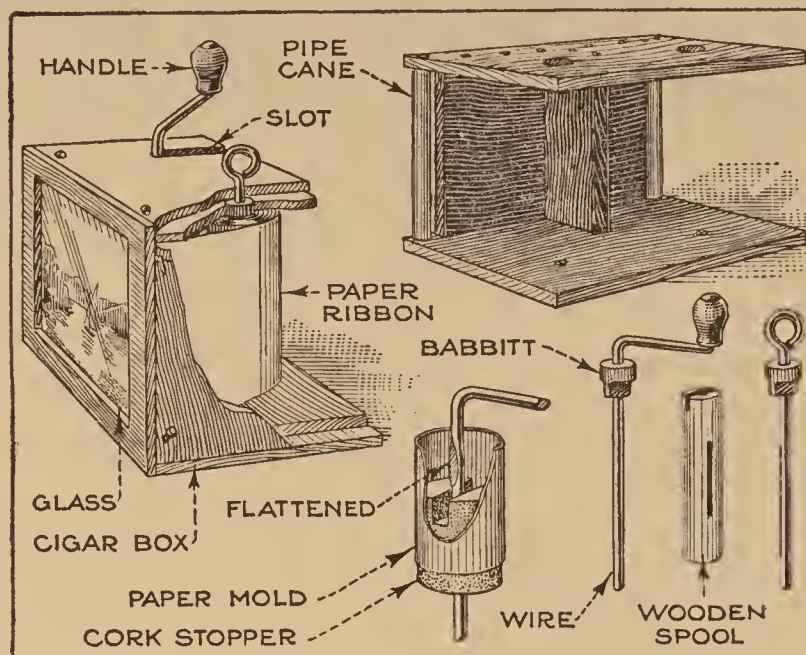
The illustration shows a device that has proved to be very satisfactory for clamping glued picture frames. Four pieces of hardwood, 3 by $1\frac{1}{4}$ in., are cut and grooved as shown. Two pieces of soft steel, or iron, about 5 in. long and 1 in. wide, are drilled at each end. A bolt, about 8 in. long, threaded full length, passes through the center of one plate,



which is drilled and tapped to fit it. The bolt is then turned down at the end and seated in a hole drilled through the other plate. A rope is passed around the grooves and through the holes and knotted securely, and the apparatus is assembled as shown. The turning of the bolt will tighten the rope and bring equal pressure upon all four corners of the picture frame. If the clamp screw and the rope are long enough, various sizes of frames can be clamped in the device.

"Moving-Picture" Toy for Children

A very interesting "moving-picture" toy for the small child can be made of cigar



A "Moving-Picture" Toy for the Small Child, That Is Instructive as Well as Amusing, and That can be Very Easily Made from Scrap Materials

boxes, some wire, babbitt or lead, and a few pieces of pipe cane.

A rectangular opening is cut in the bottom of a cigar box, of the size made to contain 100 cigars, and a piece of window glass, cut to fit, is placed behind the opening and held in place by tacks. A frame, shown at the upper right, made of cigar-box wood, fits neatly into the box; this holds the picture ribbon against the glass and carries the spools on which the ribbon is wound. A piece of pipe cane is mounted at each corner of the frame, to serve as a roller.

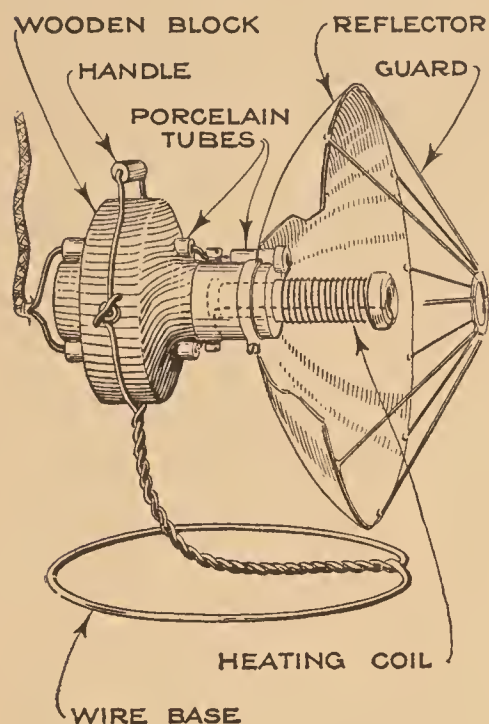
The spindles, one of which has a crank formed on one end, are made of No. 9 galvanized wire, and are provided with babbitt or lead "keys" to turn the wooden spools on which the ribbon is wound. To make these keys, a portion of the wire should be flattened, as shown. A cork stopper is then taken, and, after a groove is cut in the top and a hole drilled through the center, it is pushed on the wire directly underneath the flattened portion. By wrapping heavy paper around this cork, a cup is formed, into which the babbitt can be poured. The wooden spools upon which the ribbon is wound can be made from old film spools, cut at one end to fit the babbitt key.

Children can be amused for hours with this little toy, which can be made instructive as well as amusing. Pictures cut from the comic or rotogravure sections of newspapers, and pasted to the ribbon in order, make very interesting moving pictures of this kind, although, of course, any suitable pictures may be used.

A Substantial Electric Radiant Heater

Many electric radiant heaters are made with porcelain cores in several parts, and these are very easily broken. After breaking one of these cores several times, it was found possible to remodel the heater so that the risk of breakage was reduced to a minimum.

A hard-maple block, 5 by 2½ in., was turned in a lathe to the shape shown, the middle part being made 5 by 1½ in., and



the ends turned down to about 1⅞-in. diameter. On each side of this block a hole was bored. A porcelain wall receptacle was obtained, and all the copper lining, except the lower part of one pole, was removed, a type of receptacle that had the screw hole in the

center being used. A common porcelain tube was wrapped on one end with asbestos, and this end was glued firmly into the wall receptacle. The wire of the old heating coil was wound around the tube, care being taken to have sufficient space between the turns to prevent short circuits. Both ends of this wire were brought back to the pole screws of the receptacle, one end through a small porcelain tube in the reflector, and the other through the center of the heating-unit tube. The outer covering of the extension-cord, but not the insulation, was cut away, and the single conductors were brought through porcelain tubes fixed in the holes in the wooden block, and connected to the pole screws of the receptacle. Soldering the wires to the pole screws made them secure. A thin collar and a clamp screw were used to attach the reflector to the receptacle. An attractive and rigid base was then made of No. 4 copper wire, twisted as shown, and attached to the wooden block with thumb-screws, in such a manner that the heater could be adjusted and locked at various angles. The wire was also brought around the top to hold a wooden handle. The exposed pole screws should be taped and varnished to protect the user.

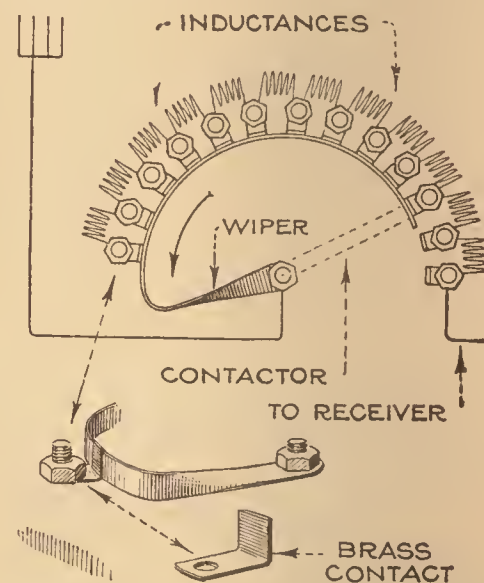
Book Ends Made of Angle Iron

A neat pair of book ends can be made from two pieces of angle iron, the size varying according to the size of the volumes to be supported. The pieces are ground smooth on a grindstone or emery wheel, and then painted or enameled to give them a neat appearance. A layer of felt, glued to the bottom, will prevent them from scratching the finished surface of a table or desk.

Dead-End Switch for Inductances

The efficiency of a radio-receiving set can often be improved to a considerable extent by the use of a dead-end switch to short-circuit the unused turns of the inductance. The switch illustrated can be added to the set without disturbing the existing arrangement, and at a negligible cost. It consists simply of a piece of spring brass, bent as indicated, and soldered to the knob shaft, at the back of the panel.

Small pieces of brass, bent to a right angle, are drilled and fastened under the head of each contact-point screw, to provide positive contacts for the spring-brass wiper. A little care

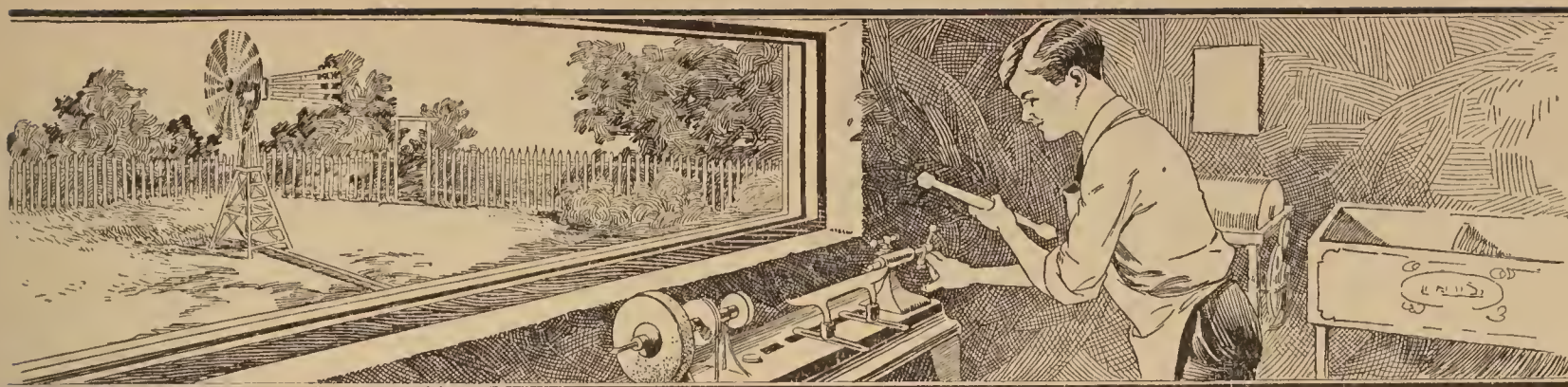


is necessary to insure that each contact piece is placed correctly, and that the wiper is in the proper position, relative to the regular switch contactor, to short-circuit the unused turns and to touch all the contact pieces.

This switch can be used with any multipoint switch in which the points are arranged in an arc, and where contact is made by a rotating switch arm.

Waterproofing Felt Hats

An old hunter uses the following method of waterproofing felt hats: A solution made by dissolving half a bar of common soap in water is liberally applied to the inside of the hat. When this is dry, a second solution, made by dissolving a cupful of powdered alum in water, is brushed on over the first. The soap is thus hardened, and becomes waterproof.



Motor Wheel Serves as Home-Shop Power Plant

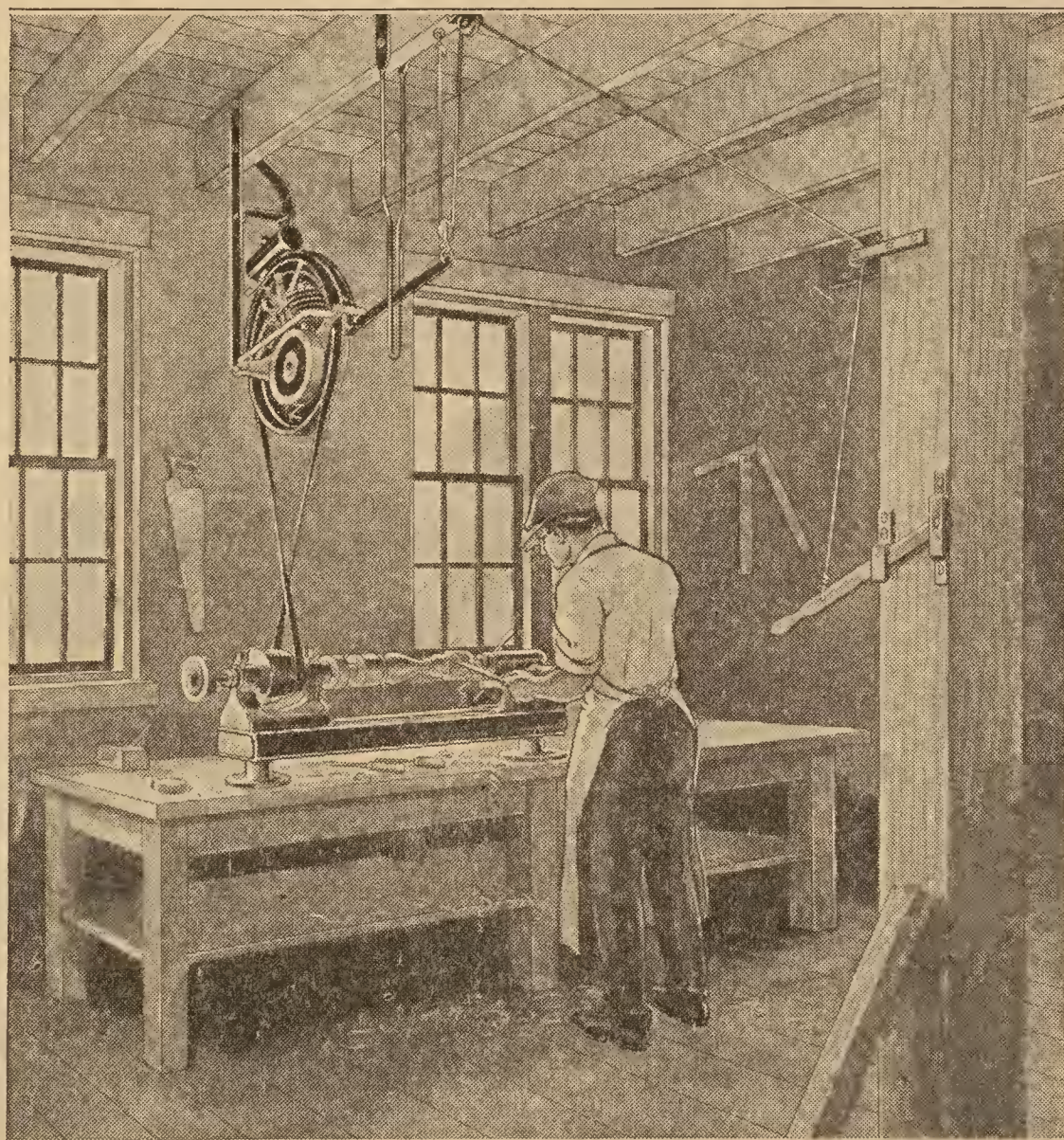
By L. B. ROBBINS

A POWER PLANT that will operate small drills, grinding wheels, lathes, and similar machines, in the home workshop, can be readily made from one of the popular motor wheels, in the manner shown in the illustrations. When the bicycle is laid up for the winter, the wheel can be taken off and used in the shop.

First, choose the location best suited for the installation; this should be an overhead beam or joist running at right angles to the bench. Set the machine to be operated on a bench, so that it will not interfere with other work, and then locate the motor wheel back of the center line of the machine, if possible, so that the belt will run at an angle. The motor wheel is suspended from the ceiling by a flat-iron hanger; this should be long enough so that, when it is fastened to the beam and the motor attached, there will be at least 15 in. between the top of the tank and the ceiling. This arrangement provides room for filling the tank with fuel. One of the hanger legs is a straight piece of iron, while the other is offset so that the bottom ends are 12 in. apart. Drill three holes in the top of the legs and one $\frac{1}{2}$ -in. hole an inch from the bottom of each; the latter is for the pivot bolt. Attach the legs to opposite sides of the overhead beam or joist with bolts or lagscrews, and make sure that the pivot holes are exactly in line with each other. Then drill a smaller hole in the straight leg, 15 or 16 in. above the

pivot hole, and bolt a diagonal iron brace to it and the beam—it may be found necessary to use two such braces, and one between the legs, as shown, to keep them rigid and perpendicular.

Place the end of the motor wheel that attaches to the bicycle between the legs, and pivot it to them with a bolt made



A Motor Wheel, Detached from the Bicycle When the Summer Is Over, and Installed above the Bench, Provides a Small Power Plant for Driving the Tools in the Home Workshop

from a piece of $\frac{1}{2}$ -in. round iron rod, threaded at both ends and provided with nuts and washers. Set a piece of pipe over the bolt to serve as a spacer; this should be long enough to keep the motor wheel bearing against the straight leg.

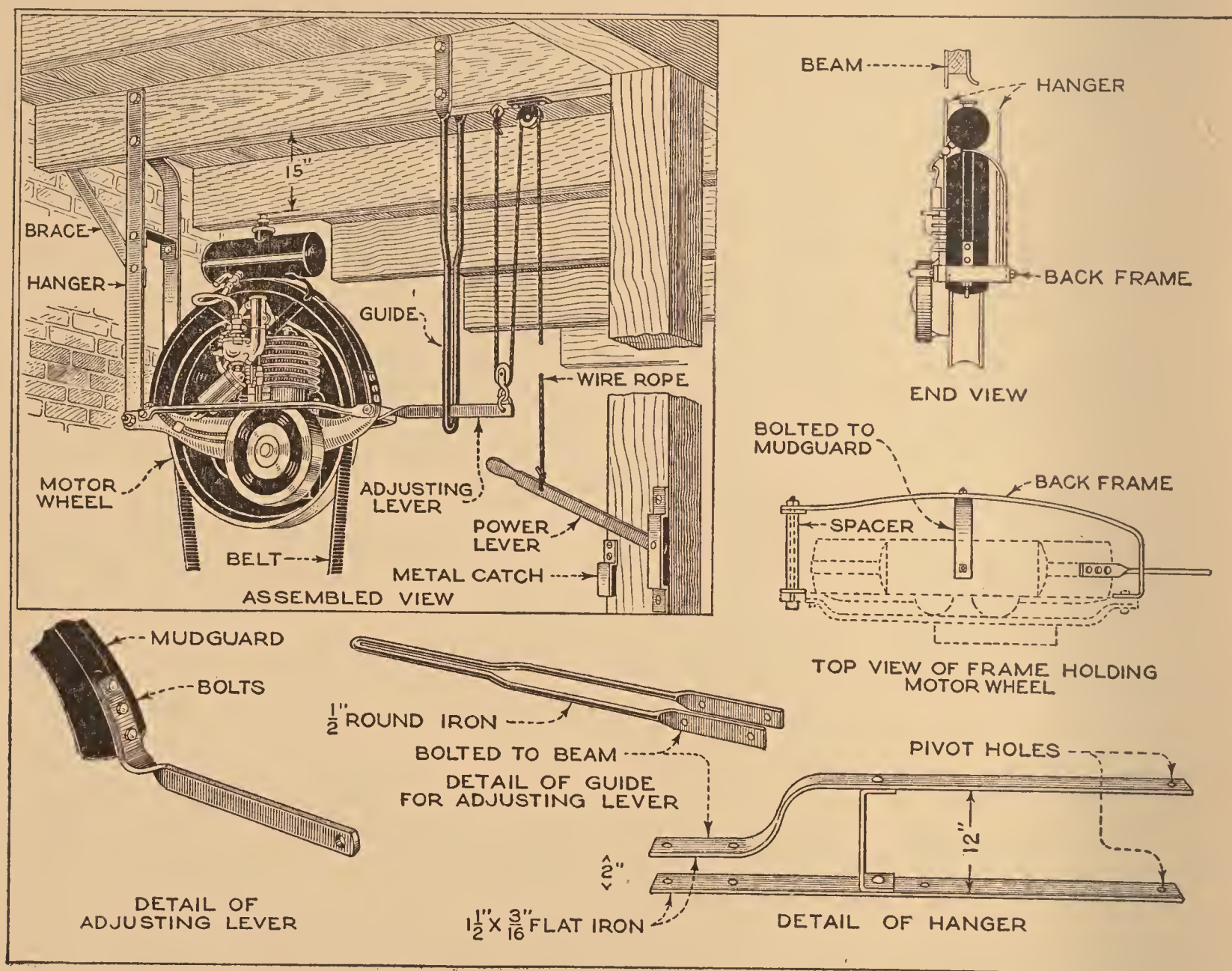
Drill two or three small holes in the rear end of the mudguard and bolt on the

adjusting lever shown in the drawing. This lever is made from a piece of heavy iron, twisted at one end and curved to fit the mudguard. Holes should be drilled in the iron to correspond with those drilled in the guard, in addition to a hole in the end for the pull wire.

Next, a guide is made from a piece of round rod, the ends of this being flattened, and bolted to the beam directly over the adjusting lever. With the motor wheel blocked horizontally, adjust the guide so that the bottom will be about 3 or 4 in. below the adjusting lever. Forge the sides of the guide together, so that they just allow the lever to slide easily between them without undue play.

and under the metal catch shown, the motor will be raised about 3 in. above the bottom of the guide.

Lastly, make a back frame of flat iron. This should be bolted to the bent leg of the hanger at the pivot hole, and to the end of the motor wheel below the adjusting lever. This is done by removing the bolt that binds the engine crankcase to the motor guard, slipping the iron against them, and bolting all three together with a longer bolt. Then bolt a properly bent piece of flat iron onto the middle of this back frame, at right angles to it, and bolt or rivet the end to the mudguard underneath the fuel tank; this forms a rigid frame and keeps the motor wheel vertical



Insert: The Complete Assembly. Upper Right: End and Plan Views of Back Frame and Brace. Lower Left: Detail of Adjusting Lever. Center: Construction of Guide. Lower Right: Assembly of Hanger

Attach a pulley and a screweye to the overhead beam, and a pulley to the end of the adjusting lever. Then fasten a length of small wire rope to the screw-eye and reeve it through the pulleys as shown. Lead the end of this rope down to a pivoted lever that is fastened to a convenient post, or to the wall, and attach it so that, when the lever is up, the motor wheel will be lowered to the bottom of the guide; when the lever is down

and always in line with the machine below.

Place the control lever in a convenient position and remove the tire from the rim, to leave a pulley large enough for high-speed work. Belt the machine so that the belt is loose when the lever is raised; this allows the motor to run without operating the machine. As soon as the power lever is pulled down and caught under the catch, the belt will be tightened

and the machine will turn. In this way the engine can be kept running while the machine is stopped for any reason.

The engine is started by setting the controls and spinning the rim, and the speed can be regulated to suit the work in hand by means of the spark and throttle controls.

Starting a Saw Cut Smoothly

Everyone using a handsaw has, at one time or another, had trouble in getting the cut started in the wood, as the teeth catch in the edge and either stop the saw or mar the edge. A remedy for this is to file smaller teeth on the last two inches of the blade nearest the handle. This may be done by filing the point off the teeth so that a notch can be cut in each of the old teeth, thus making two teeth from each one. A few strokes with these small teeth will start the cut easily. If more convenient, the small teeth can be filed at the outer end of the saw.—Chas. N. Shaw, Jr., Oxford, Ga.

Joining Rag Strips for Weaving

Much of the time and labor required to sew the strips of rags together, which are to be woven into carpet or braided into rugs, can be saved by a simple and easily made device. A small piece of thin, flat steel is bent at right angles, the upper end pointed and sharpened, and a slot or eye cut in it, through which the strips may be inserted. Two holes are also drilled into the horizontal part for attaching to a

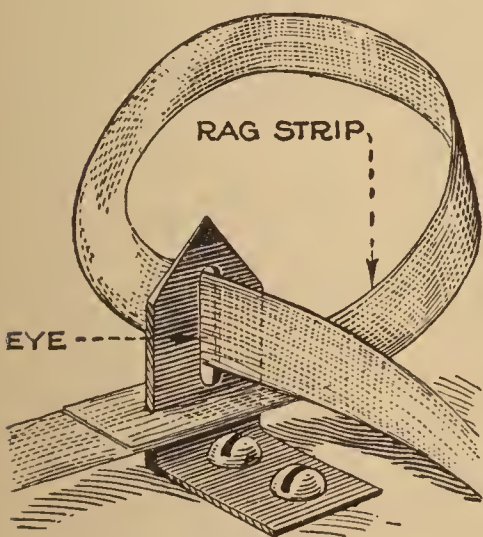
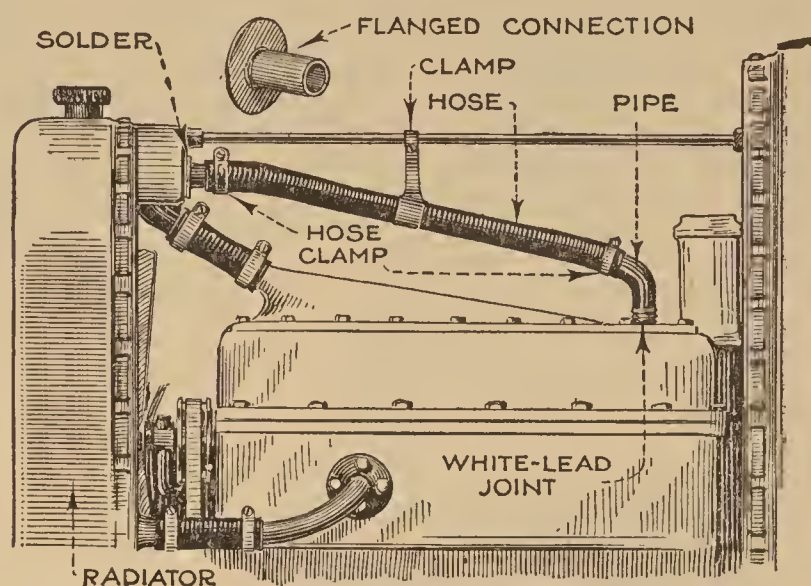


table or wooden block. In use, the strip to be joined is laid over the end of the other and both pushed down over the sharpened point; then the loose end of the former piece is

brought through the eye, and pulled up close. When this has been done, the junction of the two strips is pulled up from below, the portion in the eye passing through the slit. After the strip has been pulled out of the eye and drawn up tightly, the resulting joint will be almost perfectly flat.

Auxiliary Piping Prevents Overheating

A means of preventing an automobile engine from overheating can be provided by adding an auxiliary outlet pipe in the

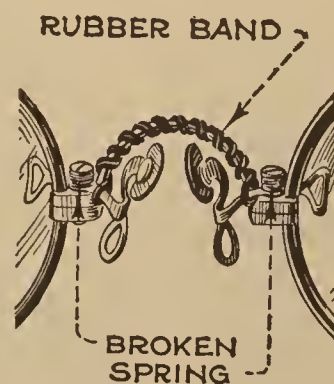


Preventing Overheating of Automobile Engine by Providing an Auxiliary Pipe: Thus the Water from the Rear Cylinders Passes Directly into the Radiator

manner suggested in the drawing. A hole is drilled and tapped near the rear of the cylinder-head casting to take a 1 or 1¼-in. pipe; this is bent as shown, and, after coating the threads with white lead, screwed into the hole. A hole is cut into the back of the upper header on the radiator, and a flanged connection of the type shown is soldered, or, better, brazed to it. The two connections are united by a section of rubber hose, which, if inclined to vibrate too much, can be supported from the radiator stay rod. The extra pipe allows the hot water from the rear cylinders of the engine to pass to the radiator without passing over the forward cylinders.

Repair for Broken Eyeglass Spring

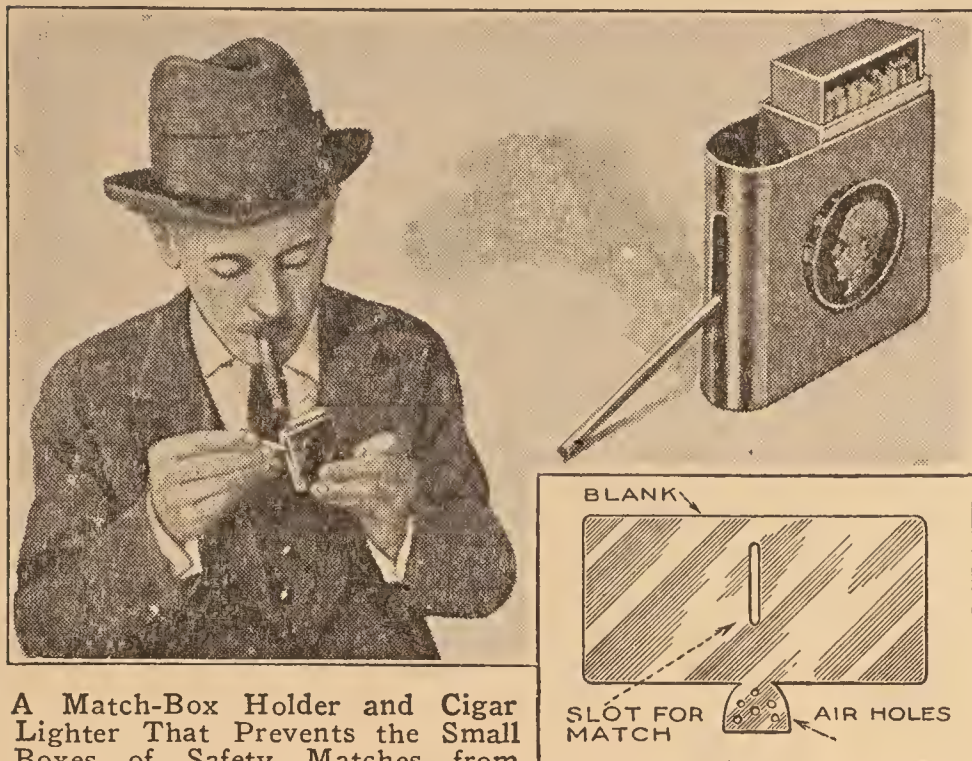
Wearers of pince-nez or "nose glasses" often find that one or both of the small springs on the bridge of the nosepiece are broken, or have become so weak that the glasses slip off. Of course, the proper thing to do is to take the glasses to a jeweler or optician for repair, but, in an emergency, resort can be had to the method illustrated. One end of a small rubber band is slipped



over one of the guards and wound around the bridge often enough to obtain the proper tension, when the opposite end is pulled over the guard on the opposite side.—Truman R. Hart, Ashtabula, Ohio.

Match-Box Holder and Lighter

Easily made from a piece of sheet metal, the match-box holder and cigar lighter

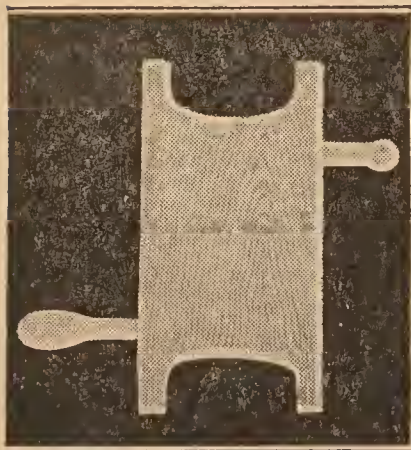


A Match-Box Holder and Cigar Lighter That Prevents the Small Boxes of Safety Matches from becoming Crushed in the Pocket, and Provides a Windshield That Makes It Possible to Get a "Light" Even in a High Wind

illustrated makes it possible to carry the small boxes of safety matches in the pocket without crushing, and provides a windshield for the flame so that it is easy to get a "light" even in a strong wind. The sheet-metal strip from which the device is formed is cut to the width of the match box, which is about $2\frac{1}{4}$ in. long. A slot is cut in the middle of the pattern, through which the match to be struck is inserted. Also, an ear, about $\frac{7}{8}$ in. long, is provided on what is to be the bottom. After the sheet-metal form has been cut, it is bent as shown, and the ear is turned up and soldered to the sides. The holder illustrated is embellished with a foreign coin.

A Two-Handled Cord Reel

A reel that will save much time in the winding of kite strings, fishlines, clotheslines, and other cords, can easily be made from a piece of board of the proper length. The ends are cut out to hold the cord and to prevent it from slipping off, and handles are fastened on opposite edges of the board, near each end, as illustrated. After attaching the cord to the reel it may be wound up easily and rapidly.

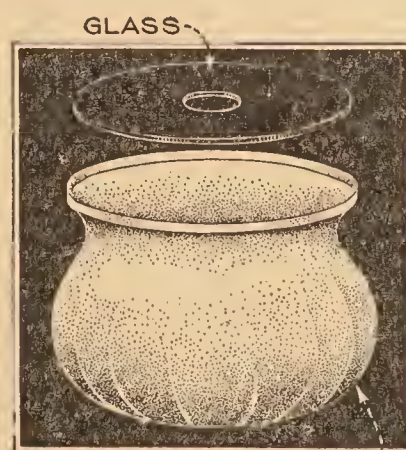


Pulling Light Car Out of Mud

An owner of a light automobile has used a novel idea for extricating his car from bad mudholes. He raises the engine hood and passes one end of an ordinary clothesline through the footboard, tying it to the clutch pedal. The engine is then speeded up, the driver walks to the loose end of the rope, throws it over his shoulder, and pulls. This throws in the clutch and applies power to the rear wheels, which, together with the force of the pull and the lessened weight in the car, suffices to pull the car out in most cases. As soon as the pull on the rope is relaxed, the clutch will throw itself out, and the car stops. The emergency-brake lever should be kept in the neutral position during the operation; this allows the low-speed band to engage, but prevents the pedal from flying back into high and stalling the engine.

Keeping Insects from Light Bowls

A mercantile concern has a large number of inverted electric-light globes under a balcony that runs around the store. Formerly it was a regular weekly job for the porter to unscrew the globes and re-



move the accumulation of dead insects and other matter that collected in the bowls. Finally, shields of glass, cut circular to fit the open ends of the bowls, and with a hole in the center to slip over the light sockets, were used to cover the openings. This arrangement did not interfere with the illumination and kept out the dust and insects. Having successfully demonstrated its usefulness, the idea was applied to all the lamps in the store.—Chas. A. Goddard, Los Angeles, Calif.

¶A small hole drilled through the socket provided in stove lids for the lifter, will allow the light from the fire to shine through so that the location of the socket is easily found in the dark.

Making Varicolored Flash Papers for Stage Effects

Amateur plays are often produced in small communities where there is no electric-lighting current. If the play calls for fire scenes, lightning, artillery fire, explosions, etc., it is difficult to produce much of an effect without electric lights. For just such occasions, a set of varicolored flash papers will produce the effects desired. These papers can be prepared at home at small cost.

It is well, at this point, to call attention to the danger attending the use of these sheets, as well as of colored fires, etc., in close proximity to scenery, costumes, and other "props" that have not been fireproofed. Sheets of tissue paper, about 12 in. square, are used; these are cut in half for small, weak flashes, while, for longer ones, a whole sheet can be used. The tissue paper is soaked in aqua fortis, which should be bought ready-mixed from the druggist. The paper is thoroughly soaked, but is taken out of the solution as soon as possible, rinsed in running water, and hung up to dry. A wooden clothespin, or something of the sort, should be used to remove the paper from the acid, which should be prevented from contact with the fingers or clothing. When the papers thus treated have dried, they are pinned to a stick, held at arm's length and touched off with a match at one corner. They will burn with a brilliant white flash.

Colored flashes are made as follows: In all cases the paper is first treated as described above, and dried before immersion in the chemical solutions that produce the colors.

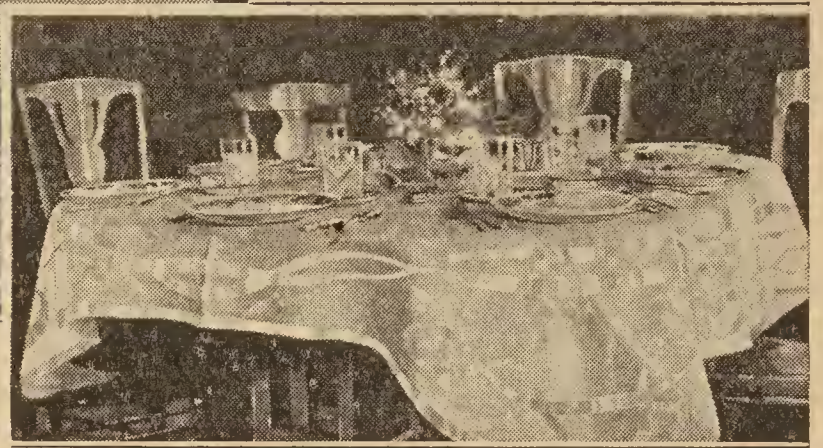
For red, dip the treated sheets in a solution of water and nitrate of strontium. Blue is obtained by soaking in copper-nitrate solution. Green can be produced from a solution of copper chloride, while a solution of calcium nitrate will produce another red. A beautiful violet flash is made from a solution of saltpeter and water.

Be sure to pin the paper to the end of a stick, which can be held at arm's length, or else fasten to a tin reflector before lighting.



Dining Table Made from a Small Gate-Leg Table

Usually the extension dining table is a cumbersome affair for the small family dwelling in a modern apartment. The illustration shows a table that affords a real economy of space. A small gate-leg table was used, and provided with additional capacity for guests by using the two-piece auxiliary top shown. The thin boards used for making



Above: The Gate-Leg Table and the Two Parts of the Sectional Top. Below: The Sectional Top Hooked to the Small Table

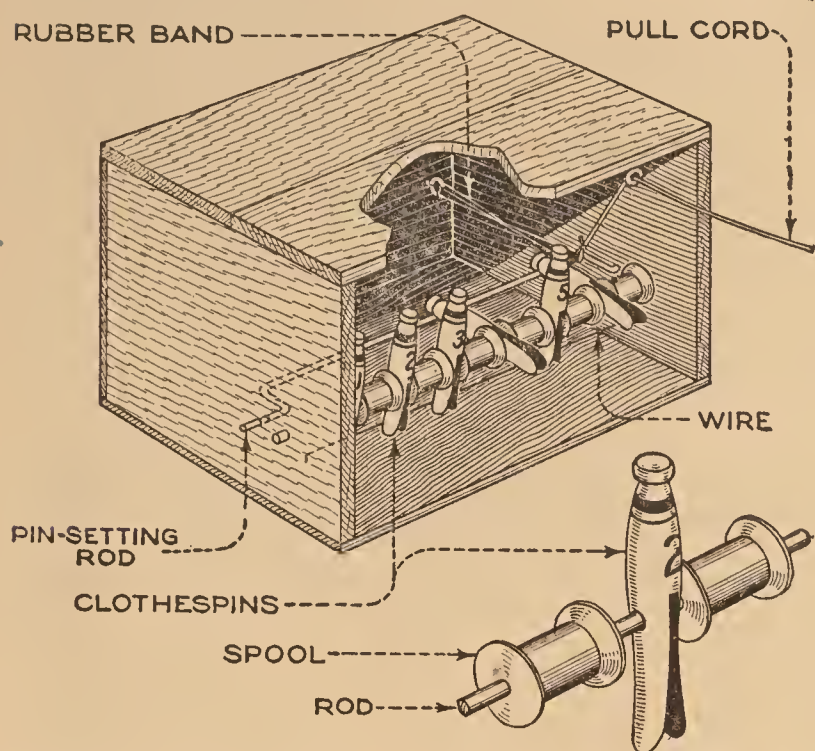
the halves were screwed to wooden battens; hooks were provided for holding the sections together at the center and to the supporting table. The small table will serve for two or three persons, while eight can be seated when the sectional top is used.—Walter C. Harris, Brooklyn, New York.

How to Bleach Beeswax

Pure white wax, which is not only desirable for certain uses but brings a higher price on the market, is obtained from ordinary yellow beeswax. The yellow wax is sliced into thin chips and laid on cloth-covered frames or trays, supported a few inches above the ground, in the open. The flaked wax is turned over frequently, and occasionally sprinkled with clean soft water, if there is insufficient dew or rain to moisten it. The wax should be bleached in about four weeks, but if, on breaking the flakes, the wax still appears yellow on the inside, it is necessary to remelt it and expose a second time or even a third, until it is thoroughly bleached. The time required for proper bleaching depends largely upon the condition of the weather and the amount of sunshine that falls on the wax.

Shooting Gallery for Toy Pistols

Skill in shooting toy pistols, blowguns, and similar harmless weapons that use peas, marbles, or wooden darts for am-



A Pistol Butt for Indoor Use, by Means of Which the Young Marksman can Improve His "Shot," with Harmless Weapons Such as Marbles, Peas, and Darts

munition, can be easily acquired by practicing on a target of the type shown in the drawing. Clothespins, spools, and some wire are about the only materials required. The clothespins, a spool between each pair, are placed on a stiff wire or small rod and fitted in a box, as shown. Back of the clothespins and a little above their lower ends is a second wire that holds them upright; this wire should be placed so that the pins will lean forward a little. When these targets are knocked over by an expert—or lucky—shot, they are caught by the pin-setting rod at the back; this rod is bent from a piece of stiff wire, and is held horizontally by a rubber band. When all the targets have been knocked over, or after each marksman's turn is over, the pins are reset by a pull on the cord tied to the pin-setting rod. If desired, the clothespins can be painted and designated by numbers.—Louis M. Steffen, Dayton, O.

How to Bake a Fish in Clay

A clay-baked fish is so simply prepared, compared with cooking it in camp, that it will be hailed with delight. The best kind of clay to use for the purpose is the gray clay generally found along streams, but in the absence of this, ordinary red clay will answer. The fish is cleaned and washed, stuffed if desired, and sewed up

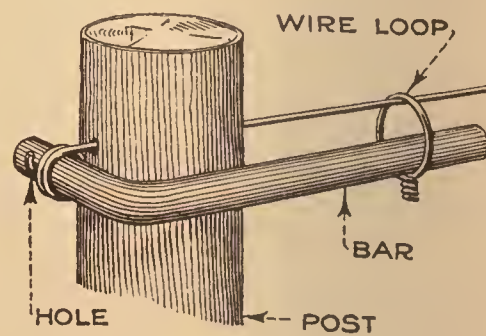
in the ordinary way; the head of the fish may be left on. The clay is packed around the fish so that there will be a 2-in. thickness of it at all points, and it is then ready to be tucked into the fire. Previously, a hot hardwood fire has been kept going; ash is to be preferred because it produces hot coals that last a long time. It is generally a good idea to convert the evening campfire into a heap of coals for the purpose. The fish is placed at the bottom of the coals, covered, and left overnight. In the morning the coals are scraped away, and the hard-baked clay crust broken away with the camp hatchet, exposing the thoroughly cooked fish, savory and palatable to the last morsel. A 5 or 6-lb. fish makes an ideal bake.—Robert Page Lincoln, Minneapolis, Minn.

Swing Stand Used during the Winter

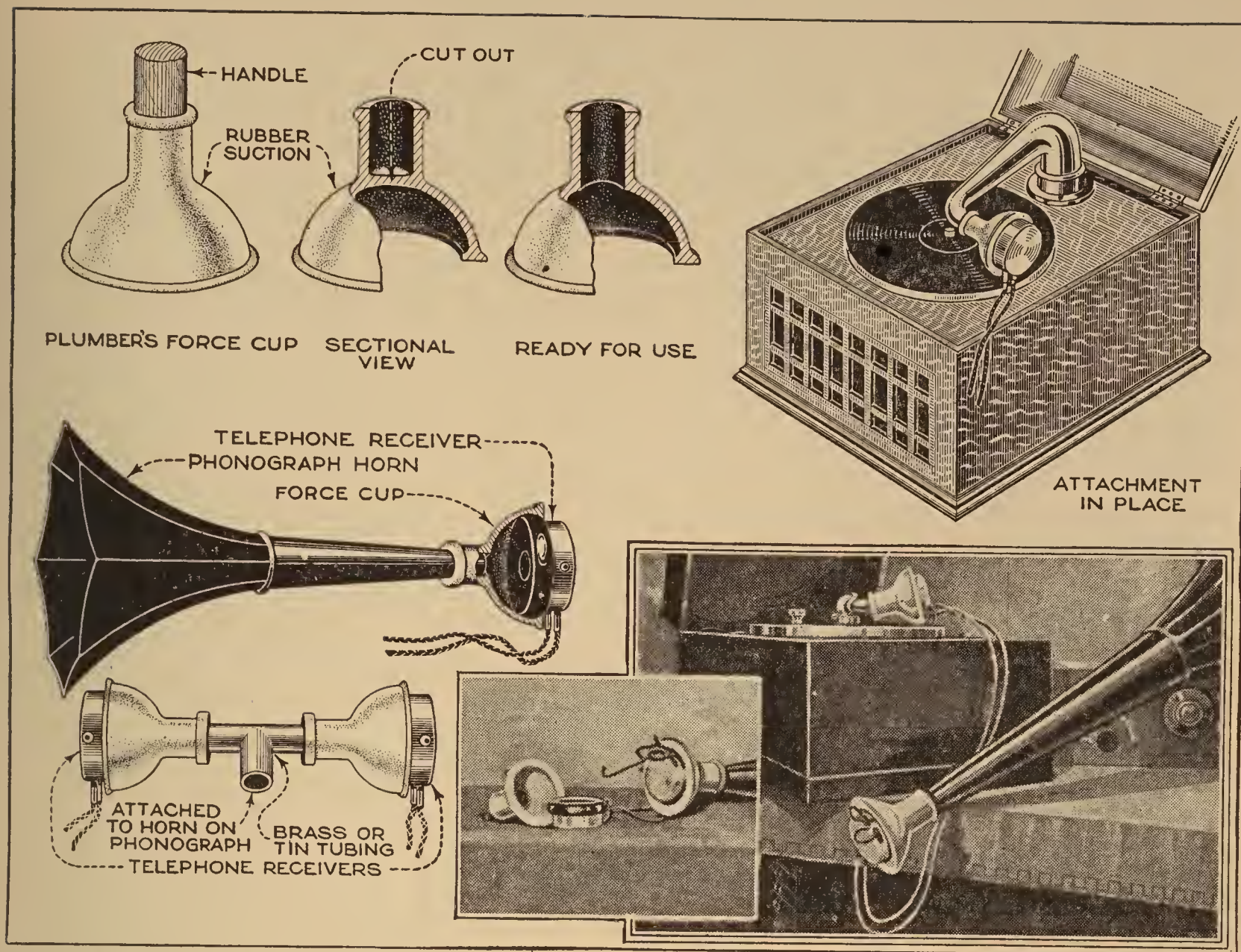
A familiar type of porch swing is suspended from a frame of steel tubing so that it can be moved to any location, either on the porch or lawn. During the winter months, when the swing is not in use, the steel frame can be used to provide additional space for the storage of clothing. This is accomplished by removing the swing from its stand and hanging the clothes—which are placed on hangers, of course—from the horizontal crosspiece.—Mrs. Elizabeth Bachman, Fullerton, Pa.

A Simple Wire Stretcher

A novel arrangement, that is simply installed on any wire line to facilitate lowering or raising, or to maintain a uniform tension, is shown in the drawing. It is made from a bent bar of round iron.



Such a device is being used, in one instance, to keep wire clotheslines taut, so that no props or other supports are necessary. The wire is led through a hole in the post and fastened through a hole drilled in the bent bar. Turning of the bar crank winds the wire around it and tightens the line. The crank is held in place and prevented from unwinding by a loose loop, or link, which is slipped over its end.



Simple Methods of Making a Loud Talker for the Radiophone-Receiving Set: One or Two Force Cups, with a Few Scraps of Tubing and a Discarded Phonograph Horn, Are the Only Materials Necessary

Making Loud Talkers for Radio-Receiving Sets

A variety of devices for amplifying the sounds received through the radiophones are on the market for the choice of the owner of a radio-receiving set—if he cares to pay the price. If his means are limited, the ideas illustrated may be applied at a cost of well under a dollar.

The only material required is one or more small force cups, such as can be bought from any plumber or hardware store. Usually these cups are mounted on a wooden handle, and this is removed, as the rubber cup is the only part used. Between the handle socket and the hemispherical cup there is a dividing wall of rubber that must be cut out, which makes the cup ready for use. One of the phone receivers is fitted inside the large end of the cup and the neck is slipped over the tone arm of a phonograph, after the soundbox or reproducer has been removed, or over the end of a horn as in the drawing. A larger volume is, of course, obtainable by using both receivers of a headset and mounting them on the ends of a tee.

Efficiency of Spark-Plug Points Improved by Sharpening

As the result of investigation as to the advantage obtained by varying the form of the electrodes through which a high-tension current was passed, it was found that the same voltage would bridge a gap from 25 to 50 per cent greater when the points were made very sharp, than when they were blunt. This knowledge was put into practice on a number of cars in which trouble was experienced due to persistent fouling of the plugs with oil and carbon. As a result of these tests, extending over a year, the invariable practice in one shop, when fitting new plugs, is to file the electrodes to a point, and make the gap the usual thickness, that of a worn dime. The practice has overcome the trouble with the plugs, and has made cylinders, which previously required weekly cleaning of the plugs, operate without a "miss" for months. It is necessary to set the points closer after a long period of operation, as the smaller points burn away quicker than the usual circular-section electrodes. It is most important to sharpen the positive electrode.

How to Make Artificial Pearls

By R. R. HENDERSON

ARTIFICIAL-PEARL making would seem, at first glance, to be a process somewhat beyond the skill of the amateur, but, as a matter of fact, very good-looking "pearls" can be turned out in the home workshop. The art is not difficult, and can readily be acquired by practice.

For many years, artificial pearls were made by coating the outside of small glass beads with a luster paint. This method, however, had the disadvantage that constant wear caused the paint to chip off, leaving the glass bare. At the present time this method is used for the cheaper grade of goods only. The better and more expensive artificial pearls are now made by first blowing thin glass globules, with a hole in each end, from thin-walled glass tubing. Then, by a special process, the interior of the globule is coated with a luster solution.

First obtain a supply of thin-walled glass tubing of small diameter. The exact size of tubing and thickness of wall depend upon the size of pearls one wishes to make, but for most ordinary uses, tubing of $\frac{1}{8}$ -in. outside diameter and walls $\frac{1}{32}$ in. thick will serve.

Place one end of a piece of tubing in the flame of a Bunsen burner, as in Fig. 1, and rotate it slowly until the glass melts and runs together, closing the hole in the end of the tube. Remove the tube from the flame and let it cool slightly. Then again insert the tube in the flame, about 1 in. from the closed end, and rotate it slowly so as to heat it uniformly all around. When the glass becomes red-hot and soft, remove it quickly from the flame and blow in the open end, as in Fig. 2, until a bulb or globule of glass appears of the desired size. Be careful not to heat the glass until too soft or to blow too hard, or the bulb may accidentally be blown so thin as to burst it. Also, if the tubing is not uniformly heated all around, the hottest spot will swell out first, and a globule of imperfect roundness will be formed. A complete globule, blown near the end of the tube, is shown in Fig. 4. After blowing the first globule, let it cool a moment so as to set and become hard. Then heat a place on the tube beside the first globule, Fig. 4, and blow another; continue in this manner until as much as possible of the length of the tube has been used, as in Fig. 5. Now, with a small three-cornered file, make a scratch between each globule and break them apart. The small tips left on each end may be ground off by rubbing

on a piece of emery paper, and then polishing with wet chalk, or, preferably, they may be melted and closed in slightly to give a finer hole, by holding the globule in a pair of tweezers and rotating the end in a fine flame. Wash a quantity of the globules in a pint of water, to which a spoonful of washing soda has been added, stirring them around thoroughly; rinse them in three or four changes of clear water to remove every trace of the washing soda, then place them in a pan in an oven to dry. The globules should not be touched by the hands after washing.

Now prepare a very thin varnish by dissolving a small quantity of mastic in acetone. To this add a very little ordinary copal varnish. Then stir into this thin mixture a quantity of "fish silver." This material consists of the carefully dried, ground, and sifted white scales of fish; it may be obtained from dealers in artists' and decorators' supplies. The complete solution, already mixed up, may also be obtained, under the name of "pearl solution" or "essence d'Orient."

Construct a coating apparatus from a glass or enamel-ware jar, as shown in Fig. 6; this is so arranged that it may be rapidly rotated about an inclined axis, and should be equipped with some sort of cover. An ordinary preserve jar serves well. Place in the jar a small quantity of the fish-silver and varnish mixture, and about three times as great a bulk of the glass globules, close the cover, and rotate the jar rapidly. In a few minutes it will be found that the interior of every globule is coated with the luster mixture, and that all the excess liquid will be in the form of drops in the inside of the globules, capillary attraction, assisted by the rubbing of the globules together, which prevents the coating settling and adhering to the outside, having drawn the liquid to the inside. Now heat the jar gently with a gas flame or alcohol lamp, rotating it again rapidly, leaving the cover off. In a short time the excess liquid will have evaporated, leaving on the interior of the globules a hard coating of the luster material, and giving the effect of natural pearls. Care must be taken that the luster varnish is very thin, and that only a small quantity is used, to prevent the excess from sticking to the inside of the jar, or to the outside of the glass globules. If, by any chance, a little of the coating should stick to the outside of the globules, it may be removed by putting them

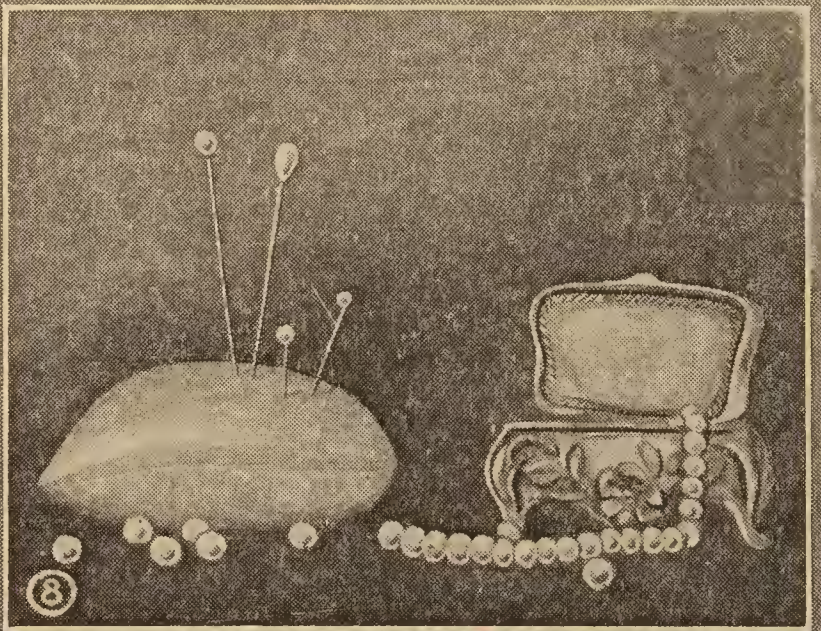
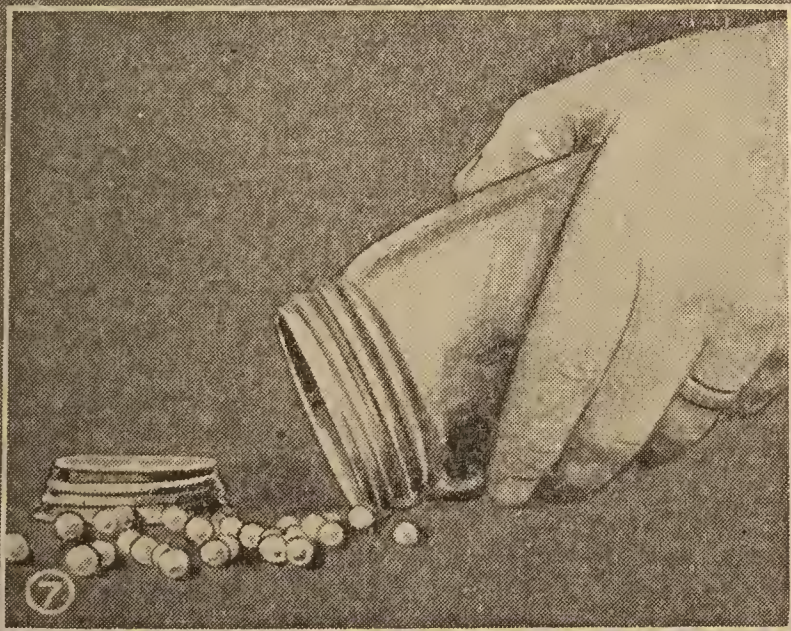
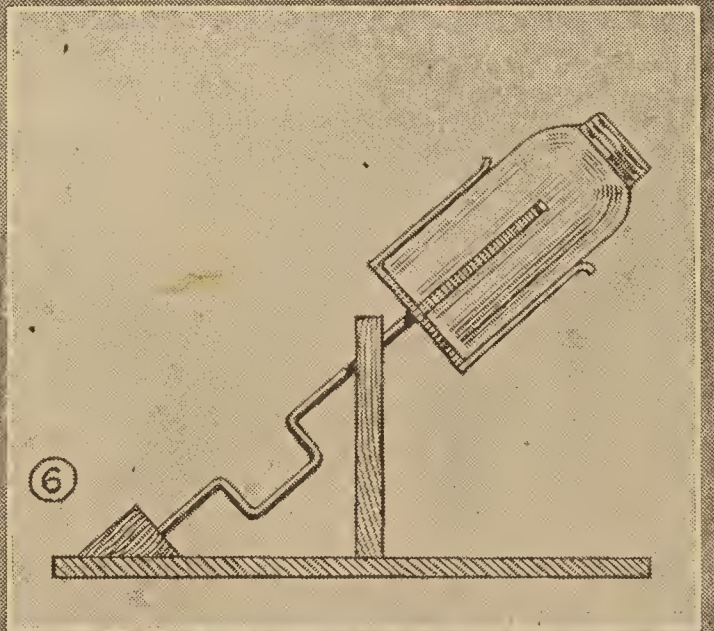
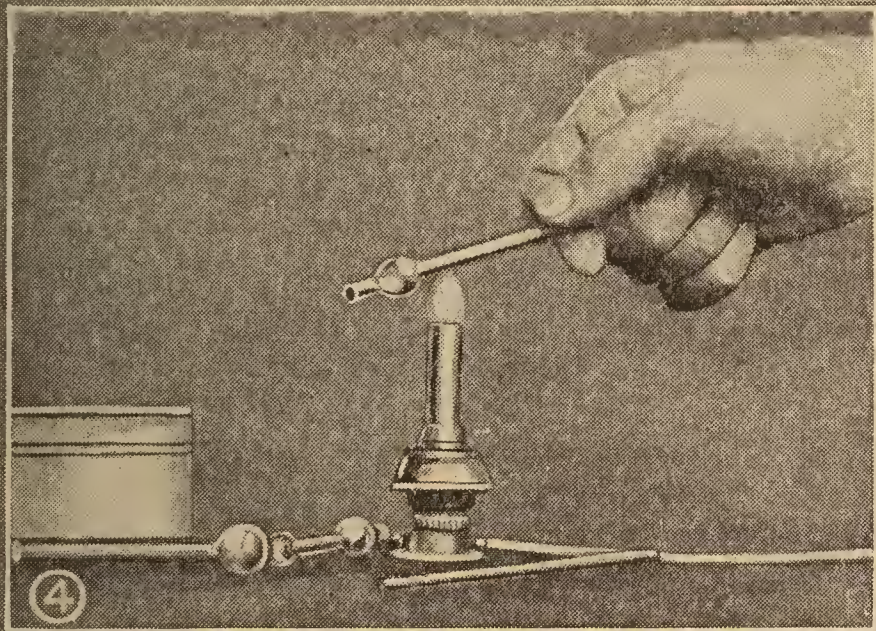
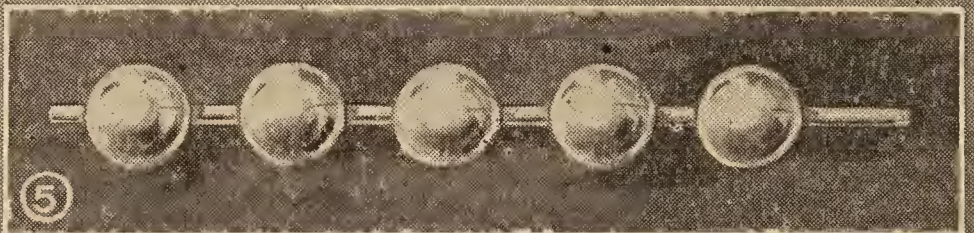
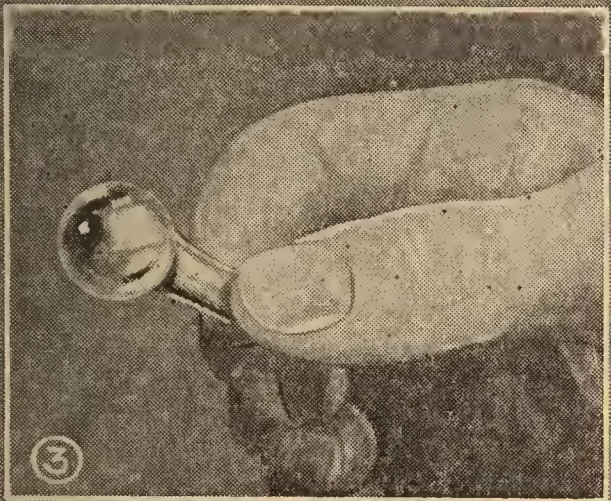
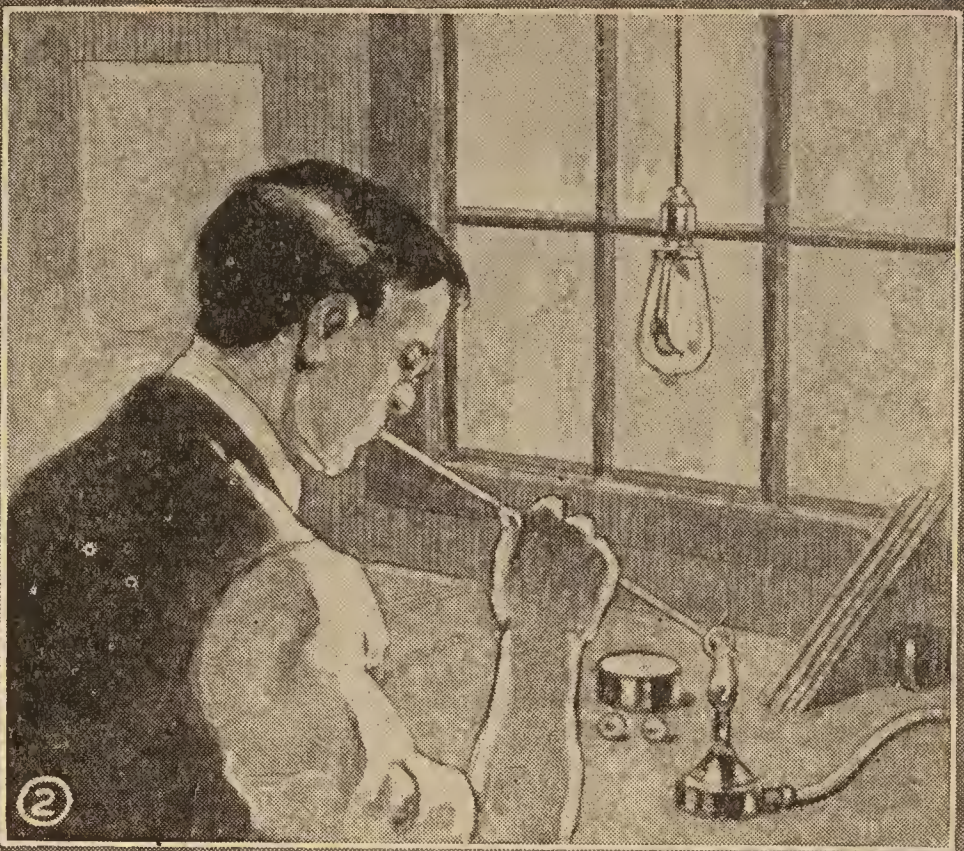
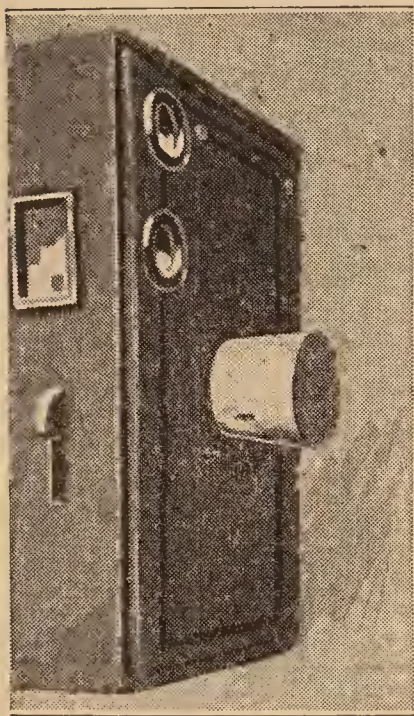


Fig. 1, Closing the End of the Tube; Fig. 2, Blowing the Globule; Fig. 3, a Hatpin Globule; Fig. 4, Preparing the Tube for the Second Bulb; Fig. 5, a Complete String of Bulbs; Fig. 6, the Coating Apparatus; Fig. 7, Emptying the Jar after Coating, and Fig. 8, Complete Hatpins, Stickpins, a Necklace, and Some Loose Pearls.
This Is an Interesting Hobby, and Is Well within the Skill of the Amateur

back in the revolving jar, with an equal amount of sawdust which has been slightly moistened with acetone. If the jar is then rotated, the rubbing of the pearls against each other and the sawdust will clean them. They may be polished by rotating in the jar with fresh, clean, dry sawdust. It is best first to sift the sawdust, so that it will contain no grains small enough to get inside the pearls through the small holes. Use the sawdust that remains on the sieve.

Cork Prevents Double Exposures

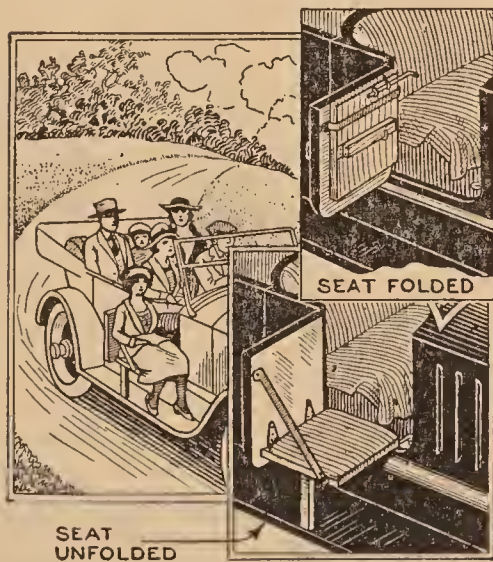
After accidentally bumping the trigger of his box camera a few times and getting



double exposures, the owner decided that some step must be taken to prevent this. The method consisted simply in the insertion of an ordinary cork into the opening in front of the lens. This arrangement not only makes the opening light-tight, but permits unlimited tripping of the trigger, and is also dustproof, thus protecting the lens and shutter mechanism. It should be borne in mind, however, that the cork must not be so long as to bear against the revolving shutter disk.

An Auxiliary Seat for the Auto

Upon occasion it is desirable, especially with a two-passenger car, to accommodate an extra



a hook and leg on the forward edge of the seat, for its support.

passenger. One method providing this extra seat is that shown in the appended sketch. This consists of a hinged seat attached to one of the right-hand doors as shown, and provided with

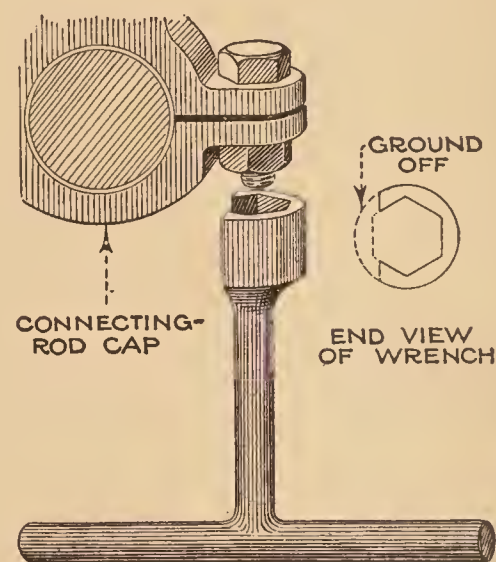
To prepare glass globules for hatpins, seal one end of a glass tube by rotating it in the flame and blow the globule directly from this sealed end; Fig. 3 shows a hatpin globule. When cut from the tube by a three-cornered file, this gives a globule with only one hole. It is coated in the same manner as the ordinary beads. Pins may be fixed in place by imbedding them in a small amount of light-colored melted sealing wax run into the bead around the pin.

This seat has the advantage that it can be folded snugly against the door when not in use.

For roadside tire repairs, or other troubles, this seat provides a handy place to work without stooping, and a shelf for the tools.

Socket Wrench for Connecting Rods

The socket wrench shown in the drawing was made for the purpose of tightening the bolts used to hold the caps of au-



tomobile connecting-rod bearings. The space between the cap body and the inner edge of the nut is generally so small that only a very thin socket wrench can be used. The result is that the wrenches are often broken. For the tool illustrated, a heavy wrench is used, one side being ground off. With this wrench the nut can be drawn up tightly without resort to a hammer and chisel.

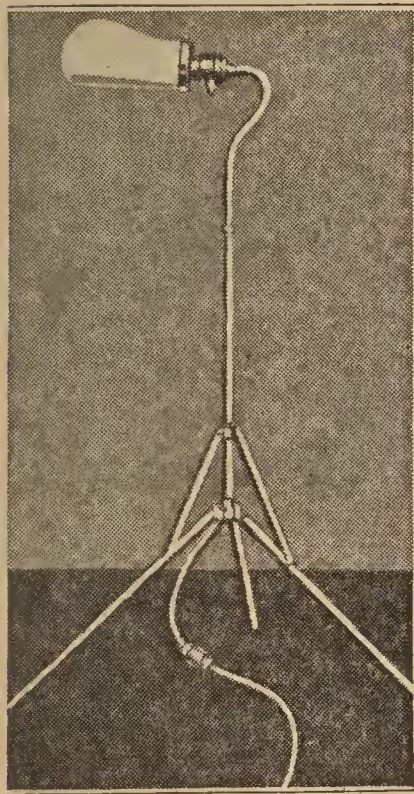
Thought Transference with Dice

A simple arithmetical trick, that is very impressive, consists in asking a member of the party to throw a pair of dice on a table, then telling him what he has "thrown." In order that the person performing the trick may not see the dice, he goes to another part of the room, where he remains until the conclusion of the trick. The performer then requests the person casting the dice to use the uppermost figure on one of the dice and multiply this by 2, then add 5 to the product,

multiply the sum by 5, and, finally, add the uppermost figure on the second dice. When he has done this, the performer tells the number of spots showing on each of the dice, although he has not seen them.

When the performer is told the number that has been obtained by the above process, it is only necessary for him to subtract 25 from it, and the remainder will be a two-figure number; one of these figures will be the number of spots showing on one of the dice, and the second will be that on the other. Thus, for example, assuming that the person tells the performer that his final number is 67, by subtracting 25 from it, 42 is obtained; then the performer knows that the figure on one of the dice is 4 and that on the other is 2. The operation from beginning to end is: $4 \times 2 = 8 + 5 = 13 \times 5 = 65 + 2 = 67 - 25 = 42$.—Raymond Dixie, New Haven, Conn.

Reading Lamp Made from Music Rack



that can be adjusted for height and is readily portable.—L. Ringer, Cincinnati, Ohio.

A Camp-Site Incinerator

Proper sanitation is a first necessity in an auto-tourist's camp site. A small garbage incinerator can be built at little expense, and the aid it will render in keeping the place sanitary is well worth the small outlay of labor and materials. The inner lining should be of fire brick, while ordinary bricks, old or new, will serve for facing. Built like an old-

fashioned beehive, the incinerator has a fire grate about 18 in. from the bottom,

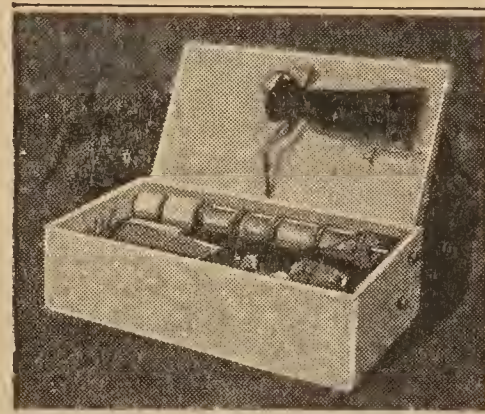


Incinerator for a Camp Site Used Mainly by Auto Tourists Helps to Keep the Camp Sanitary and Free of Refuse of All Kinds

with an opening at the top equal to about one-half its diameter at the bottom. After a wood fire has been started under the grate, the refuse is dumped through the top hole, and will be gradually consumed without further attention on the part of the caretaker. Further to facilitate the disposal of refuse, each tourist, as he enters the camp, should be provided with a wire basket in which he is requested to deposit the refuse from his tent.—C. L. Meller, Fargo, N. D.

Sewing Kit Made from a Cigar Box

An ordinary cigar box, preferably one used for holding 50 cigars, provides a good container for spools of thread, and other sewing materials, when fitted up as shown in the illustration. Two long aluminum knitting needles, such as can be obtained for a few cents, are fitted into holes drilled in the ends of the box. In the end at which the knitting needles are inserted, the holes are a loose, sliding fit, while at the opposite end they are a little smaller so that the needles will be held in place by friction. The spools turn freely on the rods, which need never be removed except when an empty spool is taken out to make room for a new one. The remaining space in the box can be used for pin-cushions, scissors, and other articles.

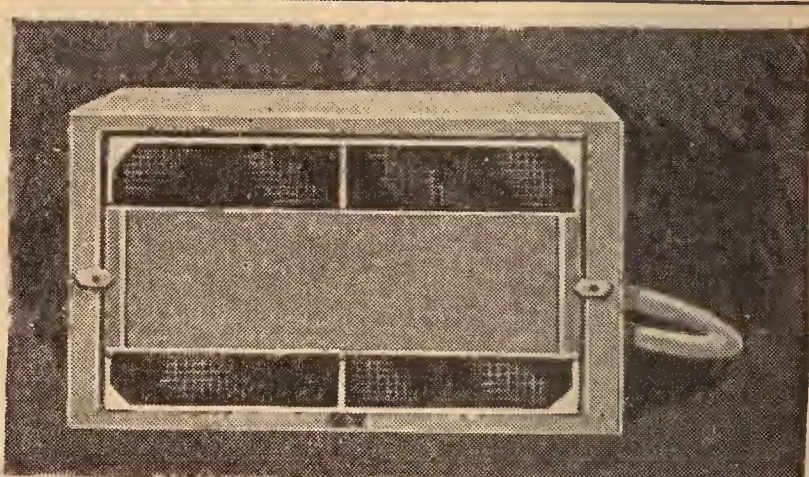
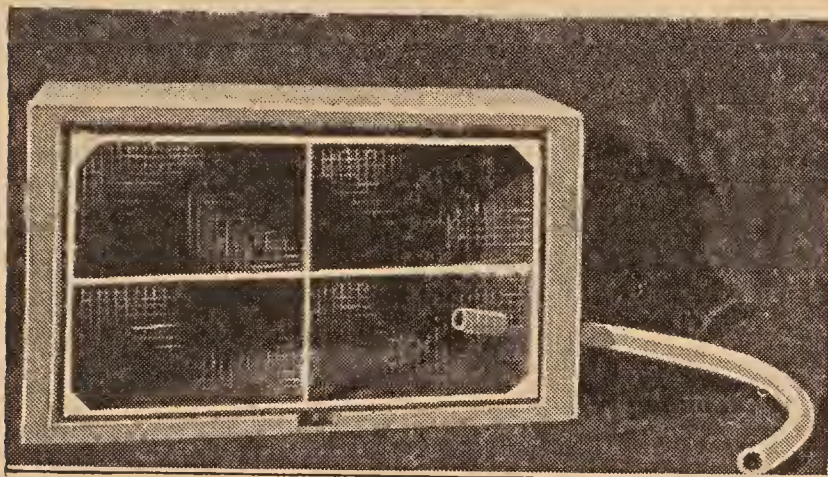
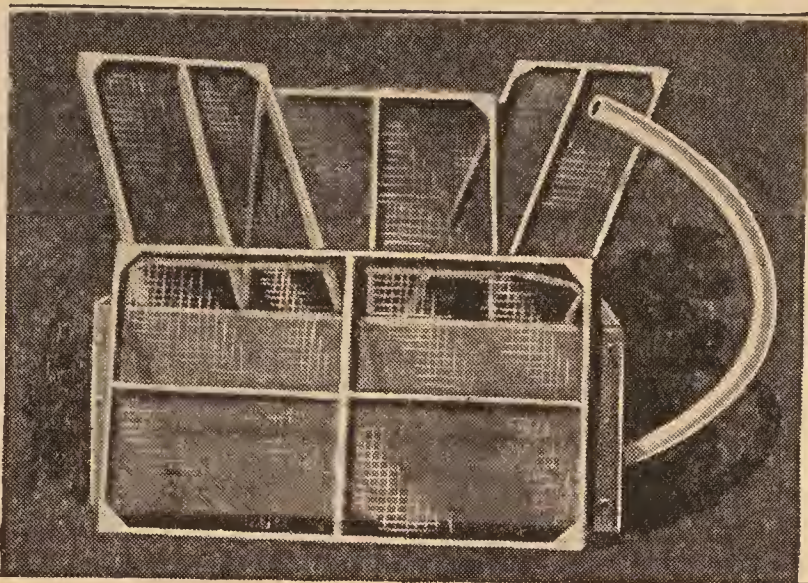


A Novel Photo-Print Washer

A great deal of time is saved by the user of the print washer illustrated, and the prints are thoroughly washed, as they do not come into contact with each other, and each is surrounded by circulating water. Ordinarily, the prints are removed from the hypo fixing solution, dumped into a pan or other vessel, and the water turned on; as the wet prints always stick together more

copper-screen wire, to prevent rusting, and the sides, ends, and partitions are made of narrow strips of galvanized iron, soldered together and to the wire screen. A small strip of wood is placed in the

bottom of the box to keep the trays from the bottom, and allow a free circulation of water underneath. The hose that carries the water from the faucet to the washer enters the box at the bottom. In use, a strip of sheet metal is placed over the top and fas-



Above: The Wooden Container and Four Copper-Wire Trays, Each Divided into Four Compartments. Left: Top View of the Washer. Right: Strip of Sheet Metal Fastened at Each End over the Top of the Washer

or less, there is no assurance that all of the prints are thoroughly washed.

This print washer consists of a wooden box, which serves as a container for four trays, divided into four compartments, one for each print. The trays are made of

tened with buttons on each end of the box, to prevent the prints in the top tray from washing out. Double the number of prints can be washed by placing two, back to back, in each compartment.—John T. Daniel, San Francisco, Calif.

The Care of Leather-Bound Books

Bookbinding leathers have a tendency to dry out and finally break at the hinge, if the leather is not kept flexible by occasional greasing. For this purpose any high-grade vaseline, free from acids, may be used. The following method of greasing the leather is that used in a large library to preserve the sheep bindings of legal volumes:

The work should be done in a well-lighted, airy place, preferably in the summer, when the windows can be opened to let in the outside air. Place the book, back up, on a table having a smooth top, and coat the back with vaseline, rubbing it well into the grain of the leather with the hand. Next, treat the sides and edges, being careful not to get

any of the vaseline on the paper. Use small quantities of vaseline and rub it in well, with a firm, flexible stroke. The first application is usually absorbed rapidly. Next apply a second coat and rub the leather down well as before. The back and back edges require more vaseline than the sides and front edges. Then place the book on a shelf to dry, which takes from 24 to 48 hours, and finally rub off all surplus grease.

Merely dabbing on the vaseline with a cloth and rubbing it off does not suffice. Neither is one application, left to dry in by itself, satisfactory. Light rubbing with cloth pads will not do the work as well as rubbing with the bare hands. Also it is better to use small quantities of vaseline, and make several applications, according to the condition of the book.

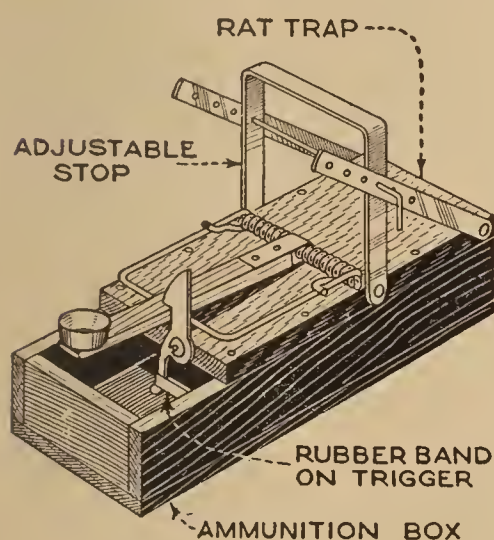
Fusible Alloys for Setting Crystals

Radio-sensitive crystals, such as galena, silicon, and the like, should be imbedded in metal to obtain the best results, and this is done by using an alloy that melts at a point considerably below the boiling temperature of water. Heat destroys the sensitiveness of the best crystals, and for that reason lead cannot be used.

An alloy which melts at 197° F. is composed of lead, 3 parts; tin, 2 parts, and bismuth, 5 parts. The melting point of the metal can be still further reduced by adding 1 part of warm mercury to the molten alloy when it is removed from the fire. The addition of mercury will cause the alloy to remain liquid at 170° and become a firm solid only at 140°. The boiling point of water is generally taken as 212° F., although the higher the elevation above sea level the lower this temperature will be.

Making a Toy Catapult

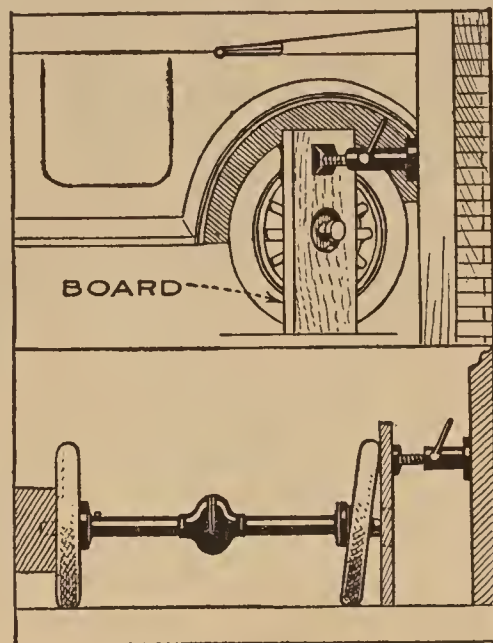
A 10-cent rat trap of the type shown in the drawing can easily be made into a marble-throwing catapult, the range of the missile being regulated by an adjustable stop. The trap is fastened to the edges of the ammunition box and the bait hook is removed. The stop is then bent from a strip of sheet metal and



fastened to opposite edges of the trap as indicated. Two side arms that serve as braces for the stop are adjusted by means of a wire pin passing through holes in the stop and arms. The throwing arm should be made of 1/2 by 1/2-in. hardwood, about 10 in. long, although the length is best determined by trial. A small metal cup at the end of the arm provides a pocket for the ammunition. If desired, a trigger arrangement, similar to that shown, can be added to the device. Flour, tied in tissue paper, may be used to make a realistic bomb, as it gives off a smokelike puff when it strikes, and is harmless. The longest throw the device is capable of, will usually be attained when the stop is set at an angle of about 45 degrees.—J. H. Kindelberger, Cleveland, Ohio.

Straightening a Bent Auto Axle

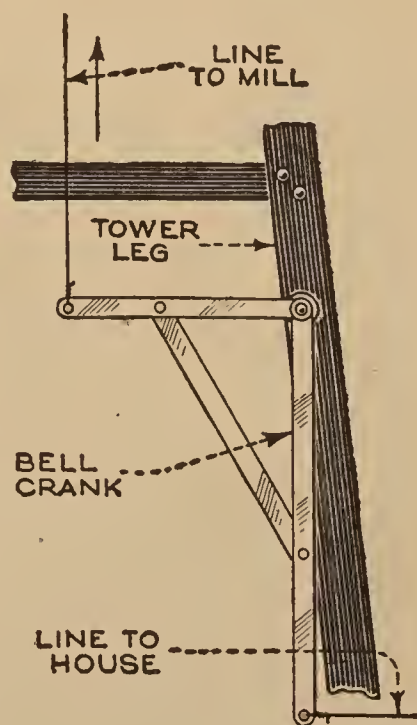
When an automobile skidded into a partly obscured curb, one of the rear-axle shafts was badly bent. The wobble of the wheel was so pronounced that further driving was out of the question. This happened near the garage, and as the use of the car was necessary for delivery purposes, the method illustrated was used to straighten up the wheel. A piece of plank, about 3 ft. long, had a hole cut in its center to clear the wheel hub. Driving the car into the doorway of the brick garage, a jack was placed between the upper end of the plank and the side of the doorway. The opposite wheel was blocked to prevent the car from being pushed sidewise, and pressure exerted on the jack straightened the axle. Repairs made in this manner should not be considered permanent.



Windmill Controlled from the House

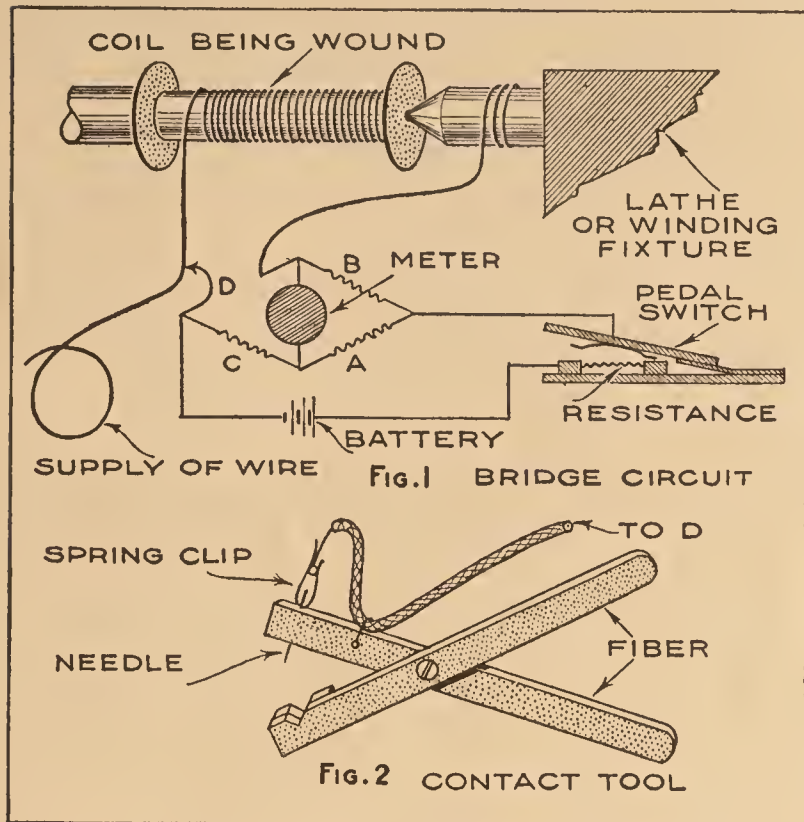
Having to go from the house to the windmill, some 30 rods away, in order to stop it when the tank is full, soon becomes quite a nuisance. To avoid this, and to control the operation of the pump from the house, the arrangement shown by the drawing was worked out. A bell crank made from a piece of tire iron, was pivoted to one of the tower legs with a bolt. Wires fastened to the ends of the crank

were led to the house and to the controlling mechanism of the windmill for throwing the pump out of gear. The pump can also be started by releasing the control wire.—Rufus E. Deering, Ottawa, Kan.



Wheatstone Bridge for Coil Winding

To wind electrical coils that must possess a certain resistance, or to wind a coil that will have the same resistance as another, are real problems to the experimenter unless he knows how to go about it. Almost every amateur is familiar with



Winding a Coil of Wire to a Certain Resistance Is an Easy Task When the Wheatstone Bridge Illustrated is Used

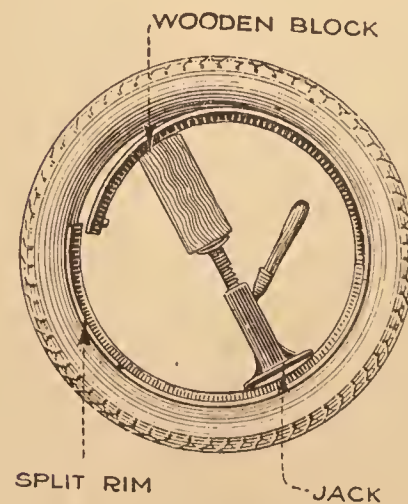
the Wheatstone bridge, by name at least; this is usually represented by four resistances in a diamond-shaped figure, with a battery connected at two of the points of the diamond and a galvanometer across the other two. When there is no current passing through the meter, it shows that the four resistances are balanced, and in proportion; that is, A is to B as C is to D. The voltage of the battery and the markings on the instrument need not be known or correct, as the accuracy of the result does not depend on them. Fig. 1 shows a method of applying the bridge principle to a coil as it is being wound, so that one may know just where to cut off the wire to get the right resistance. The galvanometer should, of course, be as sensitive as possible; it is not difficult to make one from a compass and a coil or two, or an excellent galvanometer can be obtained by removing the resistance coil from any good moving-coil voltmeter, or by connecting direct to the meter so as to bypass the resistance. The resistances A, B, and C must be of known value, if the coil is to be made a definite number of ohms, but if any one of them is of known resistance, two more can be made equal to it, by using ordinary bridge

methods, so that only one known resistance is necessary at the start.

In the figure, the coil being wound forms side D of the bridge; the inner end, or that next the meter, is grounded on the dead center of the lathe or winding fixture, and a temporary contact is made with the last turn wound by piercing the insulation. The pedal switch shown serves two purposes: It connects the battery in the circuit after the contact is made at D, and, as the pedal is further depressed, shorts out a resistance. This resistance is in series with the battery, and should be high enough to protect the meter from the high current which will result if the four sides of the bridge are much out of balance. When the first contact of the pedal switch closes and it is seen that only a small deflection appears on the meter, then the pedal can be pressed farther down, shortening out the resistance and giving greater accuracy in balancing the coil resistance against resistances A, B, and C. Fig. 2 shows a simple and handy tool for making the contact at D. Two pieces of fiber or hardwood are pivoted together at the middle; one is notched, and through the other a sharp steel needle is driven which is connected to the wire leading to the bridge. By laying the magnet wire in the notch and gently closing the needle point against it, the point will pierce the insulation sufficiently to make contact, but without damage of any importance to the cotton or enamel insulation.

Spreader for Split Rims

Automobile owners and drivers generally have trouble in bringing the ends of a split rim together when a new tire has been placed on it. Various tools are made for this work, but unfortunately, they are not usually carried on the car. The drawing shows a simple method of using the jack, which no motorist is without, and a short block of wood.



Pressure exerted on the rim through the jack and block will force the ends together speedily and easily. A block may be placed under the jack, to protect the rim.—Harry G. Schultz, Teaneck, N. J.

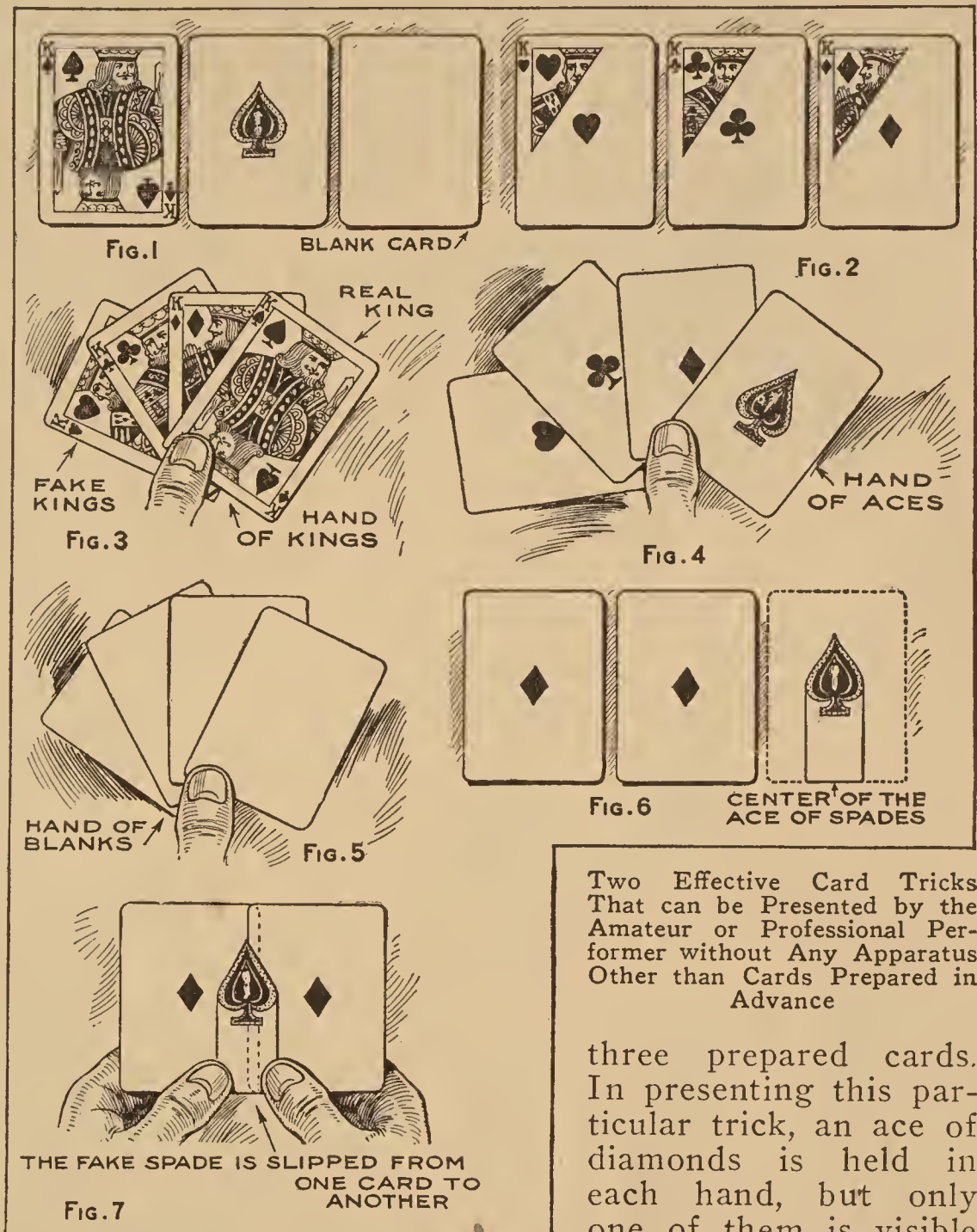
Two Effective Card Tricks

The first trick involves the use of four cards, which are "fanned" out, to show a corresponding number of kings, the performer repeats the magical "abracadabra," and, presto! the same hand has changed to four aces when it is again displayed—a third pass, and only blank cards are shown. Six

cards are required for this trick, three of which are unprepared, the other three being "prepared." The three unprepared cards are the king, ace, and blank card shown in Fig. 1, the three other cards being prepared by pasting a part of the remaining three kings over a corner of the aces of their corresponding suits as shown in Fig. 2. In the presentation of this trick, the four kings are first displayed to the audience. The real king being on top, the cards are fanned as in Fig. 3, so as to show only the kings on the corners of the other three cards. Then, the performer picks up the ace of spades, which has been left face up on the table, and announces that he will place it directly behind the king of spades, which he does. He then lays the king of spades on the table. The cards are then closed up and turned over so that the cards are held at what is the top of the cards in the first presentation of the four kings. Then, the cards are fanned out to show the four aces, as in Fig. 4. The index numbers in the corners of the aces should be erased or covered up, otherwise it will be impossible to show the blank cards.

The manipulator now states that by placing a blank card, which he picks up from the table, where the ace of spades is, the spots will disappear from all the cards. The ace of spades is placed on the table, the blank card taking its place. The cards are then closed and fanned out, the hand showing four blank cards, as in Fig. 5. In the second trick, an ace of diamonds is held in one hand and an

ace of spades in the other, but while held in full view of the audience, the cards change places. The prepared cards are made from two aces of diamonds, from which the corner index pips and letters have been erased. An ace of spades is also required, the center of which is cut from the rest of the card as indicated in Fig. 6, which shows the appearance of the



Two Effective Card Tricks That can be Presented by the Amateur or Professional Performer without Any Apparatus Other than Cards Prepared in Advance

three prepared cards. In presenting this particular trick, an ace of diamonds is held in each hand, but only one of them is visible to the audience, the

other being concealed underneath the ace that has been cut from the card. The performer then announces his intention of making the cards change places. He turns the backs of the cards toward the audience, and, with the hands apart, begins moving the cards back and forth, bringing them a little closer to each other at each pass. Finally, when the edges touch, as in Fig. 7, the false center from the card is slipped over and onto the other card; this done, the cards are moved back and forth, gradually separating them, and their faces are again turned to the audience, when, to all appearance, the cards have changed their positions.



BUILDING A SIMPLE RADIO RECEIVER

By F. L. BRITTIN

THE form of receiver described in this article is a very popular one for reception from broadcasting stations; it gives excellent results for distances up to 250 miles and can be built at small cost. Under average conditions, telegraphic signals can be received within a radius of 1,500 miles, on wave lengths from 150 to 400 meters. The instruments are mounted on a $\frac{3}{16}$ -in. bakelite panel, fastened to a wooden base by two angle irons. The variable condenser used is of .001-mf. capacity and is of the panel-mounting, 43-plate type. The variocoupler may either be bought ready-wound, or the knock-down parts are wound and assembled. The stationary bakelite or cardboard tube is wound with 40 turns of No. 20 single cotton-covered magnet wire and six taps are taken off at approximately equal steps; these taps are led off to the contact points of the primary switch, as shown at the upper left. The secondary, or rotor, of the variocoupler is wound with 34 turns of No. 26 single cotton-covered wire, 17 turns on each half, and the leads are brought out, through the hollow shaft, to a pair of binding posts. The tube socket is mounted on the base, at the left of the variocoupler; in front of the socket, the 6-ohm battery-type rheostat is placed, and above it several holes are drilled through the bakelite for observing the brilliancy of the tube filament when in operation. The binding posts for the ear phones are located in the panel directly in front of the socket. The switch for the primary of the variocoupler is mounted on the panel, at the right of the socket, looking at it from the rear, and it should be noted that the switch lever is connected to the ground post. Above the primary switch is located the B-battery switch, which has the "off" point at the right; this switch is for the purpose of varying the B-battery

voltage on the plate of the detector tube. The grid condenser is placed on the panel above the variocoupler; this condenser is of standard type with a capacity of .0005 mf. The grid leak has a resistance of 2 megohms, and is of the ordinary type, obtainable from any dealer in radio supplies. Six binding posts are placed on the panel, one for the aerial, one for the ground, two for the A-battery, which is a 6-volt, 40 or 60-ampere-hour type, and the other two are for the ear phones. The B-battery is a positive-tapped 22½-volt unit of standard make. The taps are connected to the B-battery switch taps on the panel; the various voltages are plainly marked on the battery unit, and should be connected to the switch in the order shown.

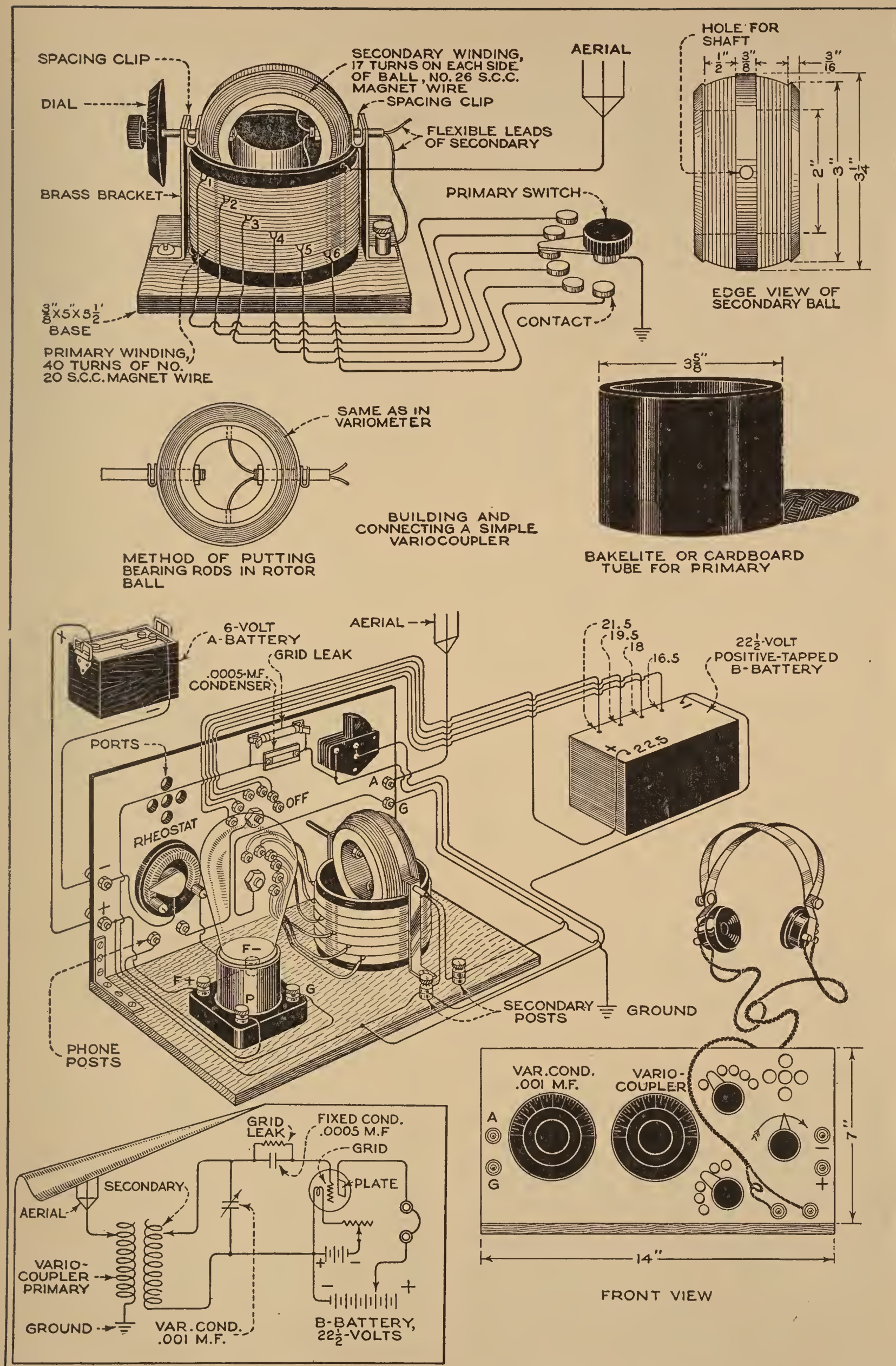
Use No. 18 insulated fixture wire for the circuit and carefully solder every connection. Bare, tinned copper wire, with varnished cambric tubing or "spaghetti" slipped over it, can be used, but the fixture wire is cheaper and serves just as well. The detector tube used is a UV-200. The dials for the variable condenser and variocoupler are of standard make.

The proper aerial to use with this type of receiver is one wire, 125 to 150 ft. long, placed from 30 to 50 ft. above the ground. The phones should be wound for at least 2,000 ohms' resistance. If desired, the instruments can be placed in a cabinet, to make a neat and compact set, at the same time protecting the various parts from dust. Many operators prefer the variable condenser in series with the aerial with a receiver of this type, instead of across the secondary, as shown in the diagram, as closer tuning may be had for the radio-phone broadcasting stations. It is suggested that both ways be tried out, to find which best suits the aerial used, as under varying conditions the results will differ.

LIST OF MATERIALS

1 variable condenser, .001-mf. capacity.
1 grid condenser, .0005-mf. capacity.
1 UV-200 detector tube.
1 tube socket.
6 binding posts.
2 angle irons.
1 battery rheostat.
1 bakelite panel, $\frac{3}{16}$ by 7 by 14 in.

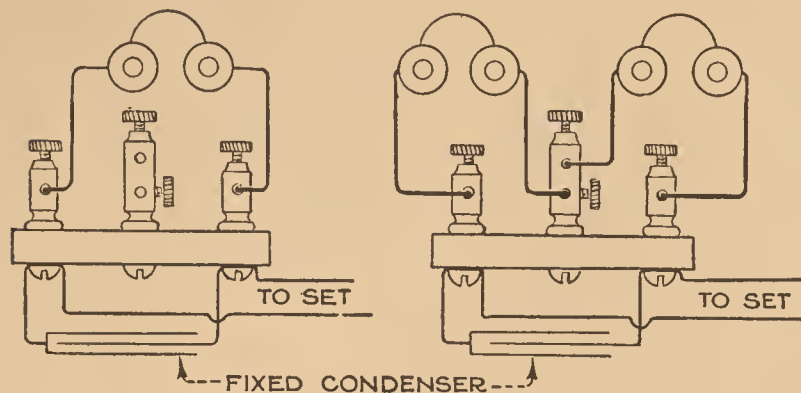
1 wood base, $\frac{1}{2}$ by 6 by 14 in.
1 variocoupler.
2 switch levers.
12 contact points.
1 22½-volt B-battery unit.
1 storage battery; 6 volt, 40 or 60 ampere-hour.
1 pair 2,000-ohm phones.



A Simple and Easily Made Receiver for Broadcasting-Station Work: It Has a Wave-Length Range of 150 to 400 Meters, and a Working Radius, for Telephone Work, of 250 Miles. Telegraph Stations can be Heard at a Distance of 1,500 Miles. Standard Instruments are Used Throughout

Block for Multiple Radiophones

When more than one set of phones are used with a radio set, they should be connected in series; it is also best to shunt



USING ONE PHONE

USING TWO PHONES

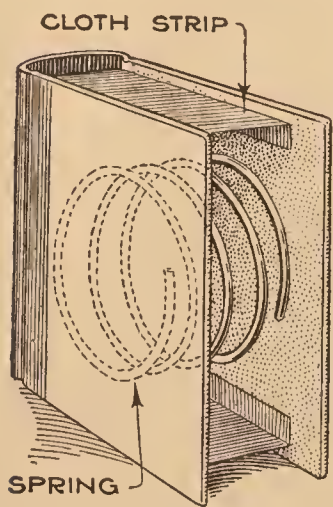
Block for Connecting One or Two Sets of Ear Phones to the Radio Set: The Efficiency of the Phones is Increased by Shunting a Small Fixed Condenser across the Phone Circuit, as Shown

a small fixed condenser across the circuit, as in the diagram.

The block illustrated for connecting the two sets of phones is fitted with three binding posts; which are mounted in a straight line. The central post is of the two-hole type and is left "blind," not being connected in the circuit. The two end binding posts are of the ordinary type and are connected in the circuit in the usual manner. The posts are spaced about $\frac{3}{4}$ in. apart, and the fixed condenser is connected across the two outside ones. When only a single pair of phones is used, the tips are fastened in the end posts, as shown at the left, but when two sets are used, the connections are made as at the right.—W. C. Michel, Jersey City, N. J.

A Bookshelf Accessory

If one or more books are removed from a bookshelf, those remaining have a tendency to fall over sideways, not only giving the shelf a bad appearance but also allowing dust to accumulate between the volumes. These troubles can be overcome by using an expansion dummy book that will automatically fill the space occupied by the removed book. Such a dummy is made by simply placing a spiral spring between



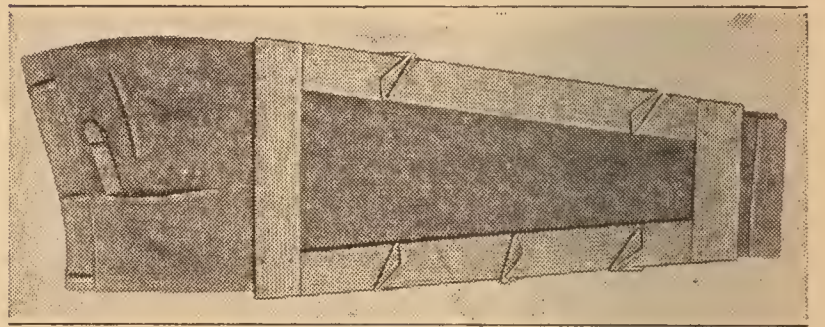
the covers of an old book. Strips of cloth are pasted between the covers at top and bottom to prevent the spring from falling out.—Harry H. Schneckloth, Omaha, Neb.

Restoring Tarnished Headlamp Reflectors

The reflectors of automobile spotlights and headlamps will frequently become tarnished, especially if the car is allowed to be exposed to the weather, dust, smoke, or fumes. A simple means of restoring the reflectors almost to their original brilliancy consists in cleansing them with alcohol and sulphuric acid. To a half pint of alcohol, a tablespoonful of sulphuric acid is added. The reflectors are thoroughly rinsed in this solution for 10 or 15 seconds, after which the surface is washed with alcohol alone, and later with clear water, then polished with a piece of soft linen. It is important that every trace of the sulphuric acid be removed from every part of the lamps, to prevent further corrosion.

A Simple Trousers Press

A device for keeping trousers freshly pressed is easily made from a few strips of light wood, tacked together in the



A Few Strips of Light Wood and Some Heavy-Wire Paper Clips, or Clothespins, Made into a Device for Keeping the Trousers Neatly Pressed

shape shown in the picture. Two such forms are made, one for each side of the folded garment, and these are held in place by means of large wire paper clips or spring clothespins. The press illustrated was made from the slats of an old venetian blind, but, of course, any light hardwood strips will serve.

Feather Dusters for Chick Brooder

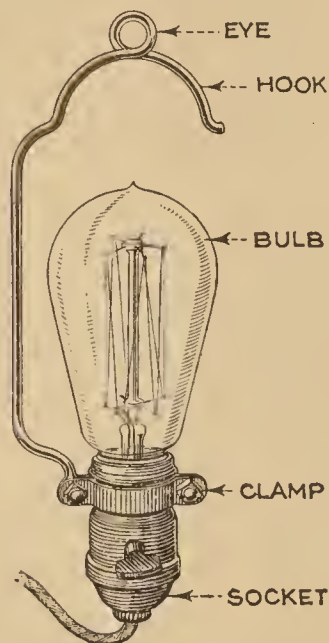
A woman raising and selling poultry bought an incubator in order to increase the number of her chicks, but overlooked the need for a brooder. However, when the eggs began to hatch, she obtained a number of feather dusters, and suspended them from the rafters in the chicken house, so that the feathery ends barely touched the floor. The chicks, just hatched in the incubator, were turned loose among the dusters, finding in them an excellent substitute for a mother hen.—Littell McClung, Florence, Ala.

Identifying Golf Clubs

A good way to mark golf clubs is to coat the end of the handle with a thin layer of sealing wax, into which the owner's initial is impressed with a seal. This method is quite effective, and a short stick of the wax can be carried in the golf-ball pocket of the golf bag, in case the wax should require renewing.—Marion B. Cook, Bellport, N. Y.

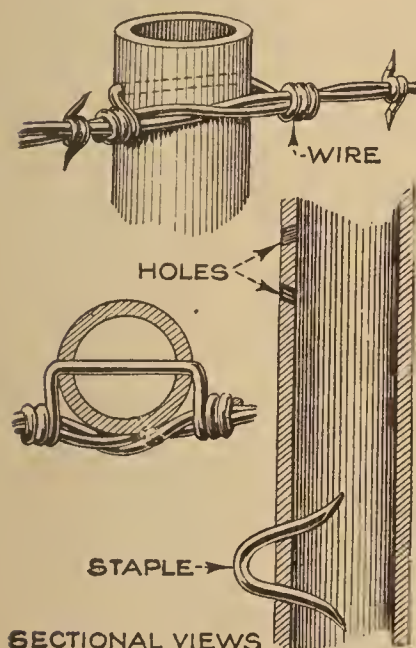
A Handy Electric-Lamp Holder

A simple hook made from wire, and a hose clamp, can be attached to an ordinary electric-lamp socket so that the lamp can be hooked to any convenient projection. The drawing shows clearly how the device is made and attached. Such an arrangement will find many useful applications in the garage, shop, home, or office. If desired, the hook can be turned at right angles to the light.—George O. Reed, Detroit, Mich.



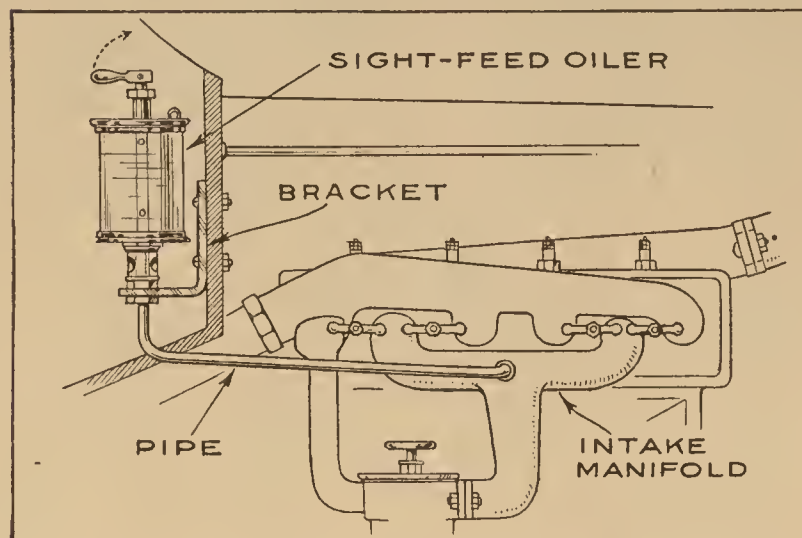
Fastening Barbed Wire to Iron Posts

Occasionally it is desired to attach plain or barbed-wire fencing to posts made of old iron pipe. The simplest way is to drill small holes through the post wherever the separate strands are to come and use wire ties. After the posts are set up, the ties, each about 1 ft. long, are run through the holes and wrapped around the wire on opposite sides of the post. Regular fence staples can be used if the holes are drilled at an angle, so that, when the staple is driven in, the ends will spread apart inside the pipe, and prevent the staple from being pulled out, accidentally, while permitting it to be removed easily, when desired.



Priming the Auto Engine

An ordinary sight-feed oil cup, such as used on most types of stationary engines, affords a convenient means of holding a



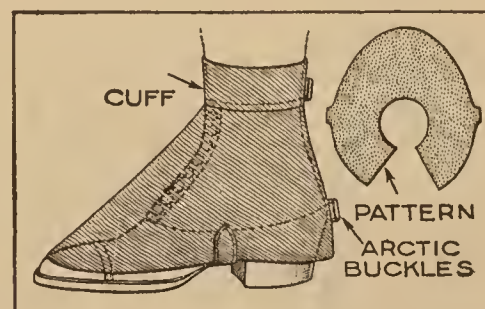
A Sight-Feed Oiler, Attached to the Dash of the Auto, Affords a Convenient Method of Priming the Engine in Cold Weather

quantity of special high-gravity fluid for priming an automobile engine. The oil cup can be mounted on the dash of the car, on a sheet-metal bracket, as indicated, the priming fluid being conducted to the intake manifold of the engine through suitable tubing.

By this method the engine can be primed from the driver's seat without the necessity of raising the hood to inject gasoline into the cylinders through the priming cups. The flow of fluid to the engine is controlled by raising or lowering the snap lever on top of the lubricator. The amount fed is adjusted by means of the nut on the needle valve.

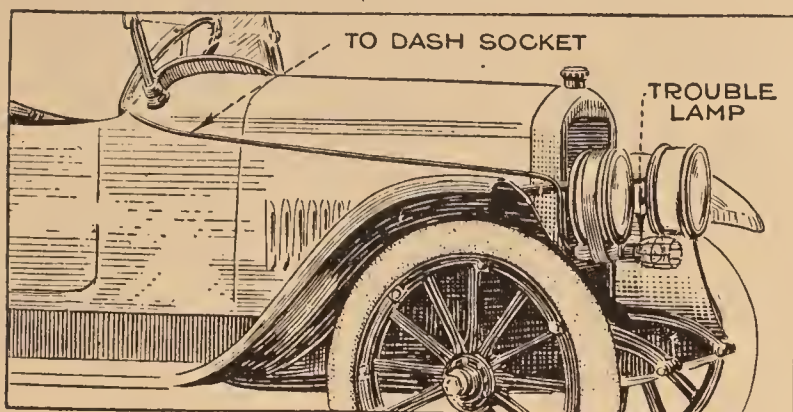
Shoe Guard Prevents Soiling and Damage

Many good shoes have been ruined by acid, oil, paint, whitewash, and other materials, which, had the shoes been suitably protected, would not have injured them. The shoe cover illustrated is made from a piece of rubber, canvas, or other material, cut to shape and fitted with a cuff of the same material, to which the buckles from a pair of old arctics are fastened. A strap fastened to the projecting ears of the guard passes under the instep like a legging strap. The old buckles are at the back and allow the covers to be slipped on or removed quickly.



Trouble Lamp Used as Headlight

A simple expedient, when one or both headlights go out, is to attach the trouble lamp to the underside of one of the



An Extension Trouble Lamp Fastened to the Underside of One of the Headlights Makes Night Driving Safe, and Prevents Arrest for Driving without Lights

headlamps, preferably the right-hand one. Cord, wire, or rubber bands can be used for holding the extension lamp in such a position that the light will shine ahead. This idea makes it possible for the driver to avoid arrest in places where the laws against driving without lights are strictly enforced.

Enlarged Photographic Negatives

The making of numerous enlargements is a tedious and expensive undertaking, when a number of large prints are required from a small negative. The alternative is to make a copy negative from an enlargement, but by this method a considerable amount of the original negative's quality is lost. By the following process, however, large prints that are as good as the negative, can be obtained from small negatives with the rapidity and cheapness of contact printing.

First, an enlargement is made in the ordinary way, but instead of making it on paper a "slow" plate or a piece of commercial film is used; the film being preferable because it is more easily handled. One grade faster than the process plate or film is about right. The process grade is too "contrasty," but may be used when the original negative is lacking in this quality. The enlargement will, of course, be a positive, and should be made slightly flat and dense; in other words, slightly overexposed and carried to a rather full development. The positive is fixed and washed in the usual way. Next, a tray, somewhat larger than the positive, is filled with water. In the bottom a piece of glass, also larger than the positive, is placed. Then, working in the red light, a piece of unexposed film of the same grade as the positive is immersed in the water so that

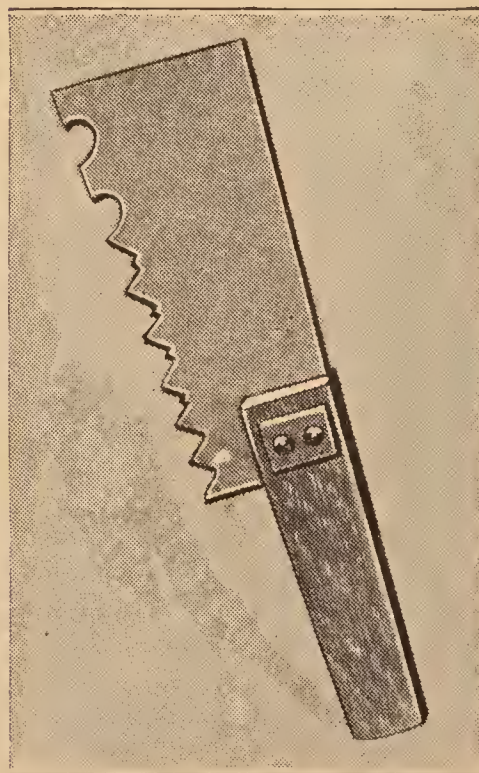
no air bells form on it, and allowed to remain until it is quite limp. Care must be taken not to touch the face of the film, which should be uppermost, with the fingers at any time.

When the film has become quite limp, it is permitted to settle onto the glass at the bottom. The well-washed positive, still wet, is immersed with a sliding motion to prevent the formation of air bells, but face, or film side, down, and settled on top of the unexposed piece of film or plate, whichever is used, thus bringing the two film sides together. Another piece of glass is slid into the water and brought down on top of the positive, with the two films between. The water is then allowed to remain undisturbed for a moment, until it becomes quiet and no movement is visible. The exposure is made by burning a match about 2 ft. above the tray. If the positive is very dense, two or three matches may be required to get full exposure. The glass is then removed, the films separated and the exposed piece developed, fixed, and washed as usual.

The resulting negative, when properly made, is fully equal in quality to the original, and is not the makeshift usually obtained by copying. While it is possible to let the positive dry and then make a negative by contact in the printing frame, the underwater process produces much better results with the additional advantage of a saving in time.

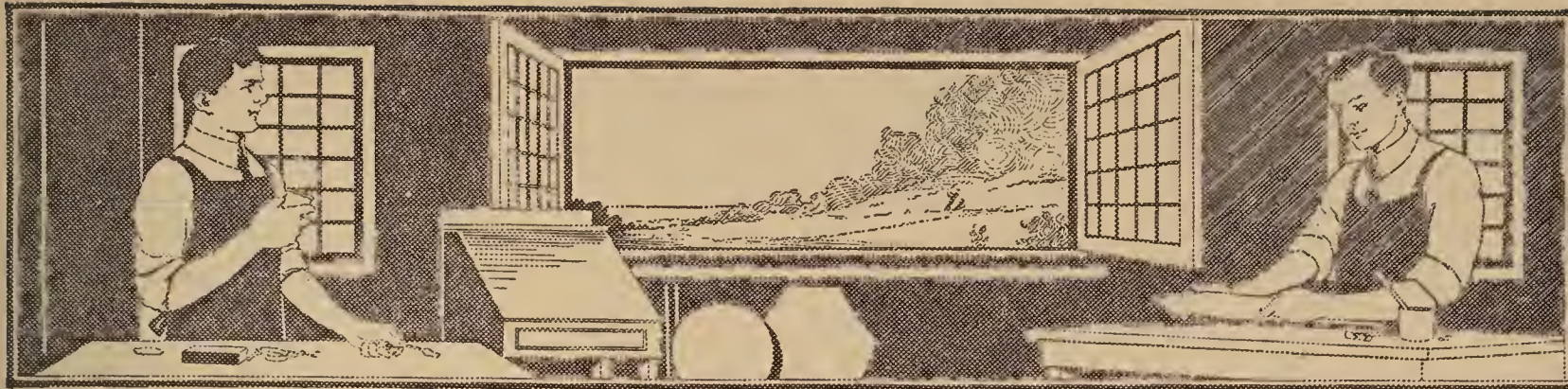
Brush Hook Made from an Old Saw

A wood cutter uses the hook shown in the picture for cutting brush and small



branches, the end of an old crosscut saw being used for the blade. Finding that his ax was not the proper implement for cutting the brush, he cut a foot from the end of an old crosscut saw and bolted it to a hardwood handle. The back of the blade is sharpened to a cut-

ting edge. This makes a splendid tool for the purpose.



How to Build a "Pushboat"

By L. B. ROBBINS

MUCH fun can be had during the swimming season with a "pushboat" of the type illustrated, which operates on the same principle as a variety of popular small-wheeled vehicles.

The hull—for lack of a better name—is made from a single thick plank, the

stern end of the upright. Round off the edges so that they will not cut the legs. A mortise is cut in the upper edge of the upright, under the stern end of the seat, to receive the outrigger, and a recess under the forward end, to clear the rudder lever. A curved piece of timber, 5 ft. long,



A Hand-Propelled Paddle-Wheel Water Craft of the Catamaran Type: The Back-and-Forth Movement of the Hand Levers Drives the Paddles through Connecting Rods and a Crankshaft. A Curved Out-rigger is Provided with Wooden and Pneumatic Floats on Either Side

bow end of which is pointed. After smoothing off the surface of the board, it is given at least two coats of good paint. A piece of 10-in. plank, 3 ft. long, is spiked to the deck and in the center of the hull, as shown. Then a seat, made from a 10 by 18-in. board, is nailed to the

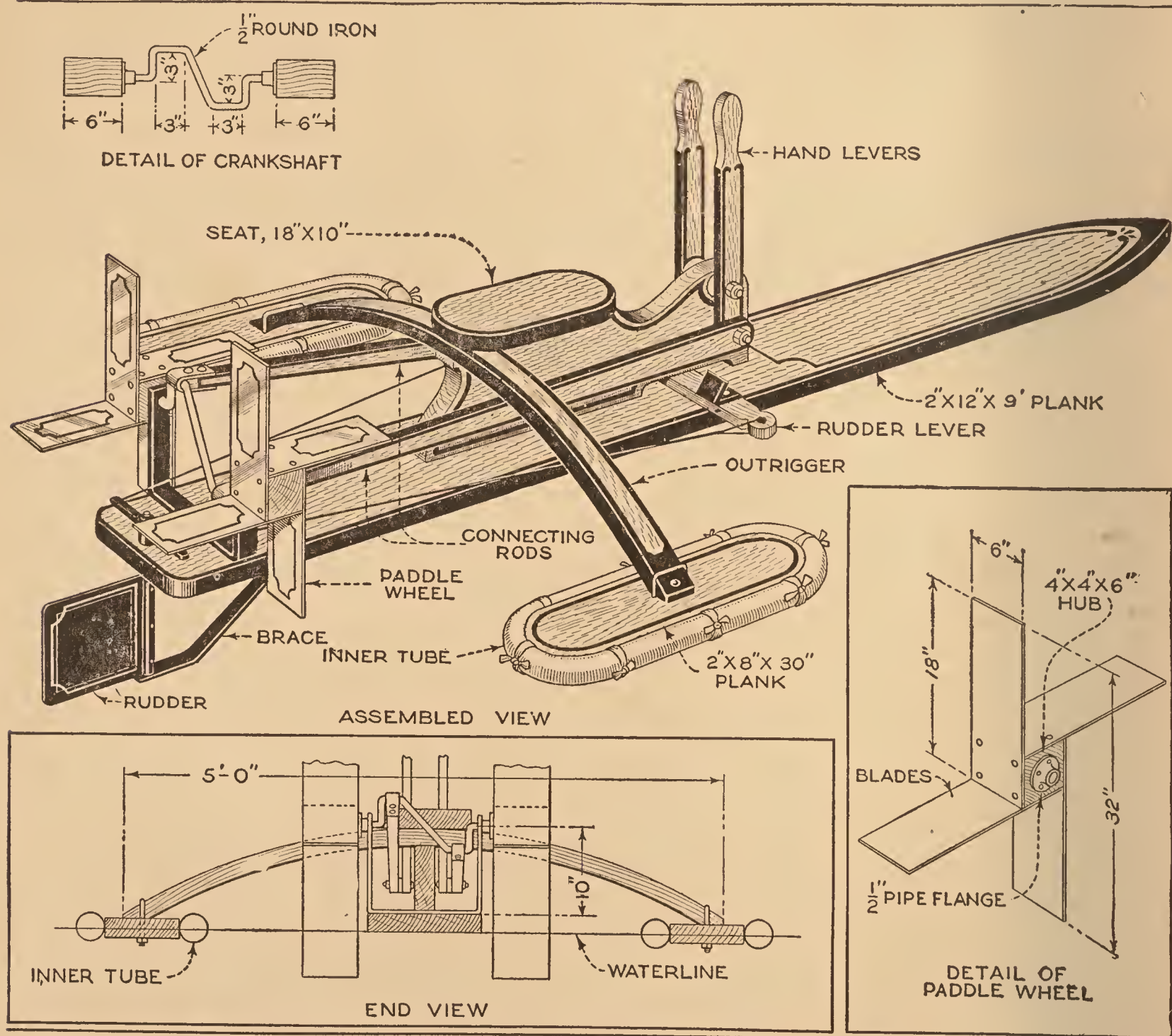
is used for the outrigger, and two round-end planks are fastened to its ends, as in the drawing. These outboard planks should be slightly lower than the hull. The outrigger is then spiked to its mortise in the upright so that the planks will be at the same distance away from the

hull and parallel with it. The planks are given buoyancy by tying an inflated inner tube around the edge of each; these can be protected with a wrapping of canvas or burlap.

Movement, forward or backward, of the craft is given by paddle wheels, operated by a pair of levers mounted in front of the seat. The paddle wheels are made by screwing four sheet-metal blades to the sides of an oak hub, as indicated in the detail drawing. Two such paddle wheels are required, and they are attached to the ends of a crankshaft, as detailed, each end of the shaft being threaded to screw into the pipe flanges fastened to

and screwed as tightly as possible, to prevent them from turning loose by the action of the wheels in motion.

Then bolt a pair of levers, about 30 in. long, one on each side of the bow end of the upright, in front of the seat. The pivot bolt goes through the top corner of the upright, and should be provided with washers. Form smooth handles at the top of the levers and drill holes about 6 in. below the pivot bolt, for the connecting-rod bolts. The levers must work back and forth freely. Motion from the levers is communicated to the paddle wheels by means of connecting rods, which are made of oak or ash. These



Detail Drawings of the "Pushboat" Which Clearly Show How the Craft is Assembled: Such a Boat Is Inexpensive to Build and can be Made Easily with Few Tools. The Outrigger Floats Make Capsizing or Sinking Difficult if Not Impossible, and It can be Driven at Good Speed in Quiet Waters

the paddle wheels. The crankshaft is supported on a U-shaped piece of heavy iron, the bearing holes being drilled 10 in. above the deck. In screwing the paddle wheels onto the crankshaft, the flange threads should be coated with white lead

rods are loosely bolted to the levers in front, while the rear ends are round-notched and fitted with flat-iron bearing straps which fit around the crankshaft. By moving the levers back and forth, the paddle wheels are revolved.

Any sort of rudder can be hung from the stern and fitted with a tiller as in the drawing, so that the hands are not required to guide the craft. After completion, the whole craft is given several coats of paint to protect it from the water.

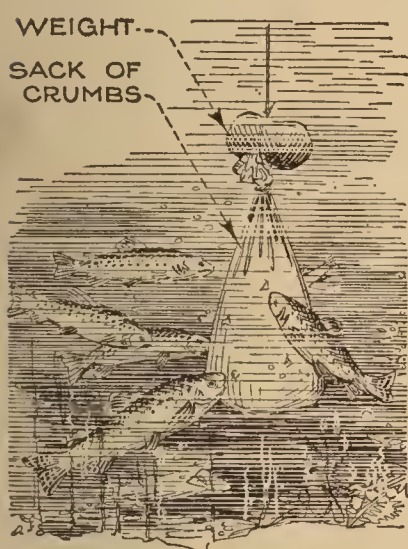
With the operator aboard, the hull will be nearly submerged, but the two

inner-tube floats at the ends of the outrigger will keep it afloat and steady so that there will be no possibility of its capsizing or sinking in smooth water.

Sit facing the bow, grasping a lever in each hand and the feet on the steering lever, and then commence to pump the hand levers back and forth, at the same time steadying the rudder.

Crumbs as Lure for Fish

Fish can be attracted to the spot where the fisherman is casting, by partly filling a paper bag with bread crumbs and meat scraps, and suspending it in the water. An ordinary paper flour bag is used, and, after it has been filled, weighted, and a cord tied around the neck, it is lowered

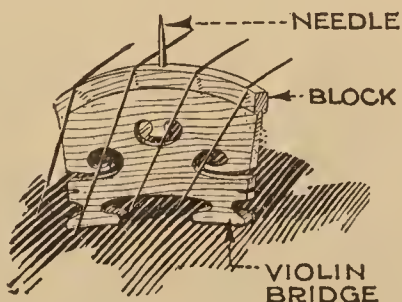


to within about 4 ft. of the bottom, at the spot selected. Two or three small holes are made in the sides of the bag and this will start a few crumbs falling, which will attract some fish. As the crumbs are seized upon by the fish, and other crumbs continue

to fall, still more fish will be drawn to the spot. After a suitable interval has been allowed for the lure to become effective, the baited hook is let down. This method is superior to the common one of scattering loose crumbs on the water.

Violin as Phonograph Reproducer

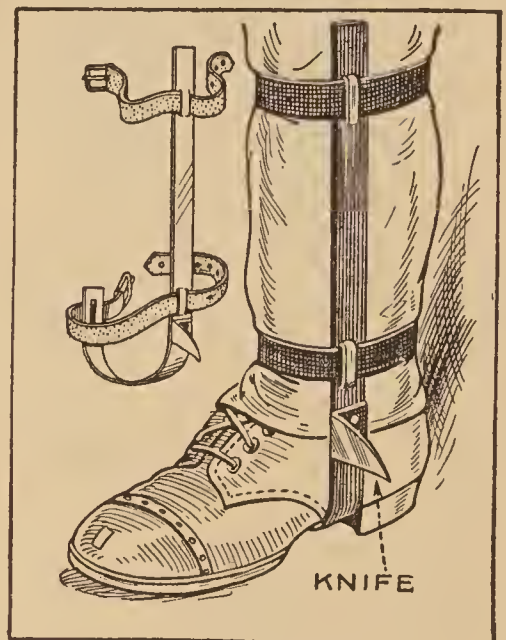
Another of the multitude of experiments aimed at getting peculiar effects from a phonograph record, makes use of a violin as a sound box or reproducer. The bridge is fitted with a small wooden block, cut to conform to the curve; this block should be about $\frac{1}{4}$ in. square and the same length as the bridge. A phonograph needle is inserted through the center of this block, which is held tightly to the bridge by the strings. The record is played by holding the violin so that the needle rests lightly on the disk.—H. M. Flint, Strathmore, Calif.



A Novel Corn Cutter

The corn harvester can work faster and with less fatigue when the corn cutter shown in the drawing is used, as both hands are left free to handle the stalks.

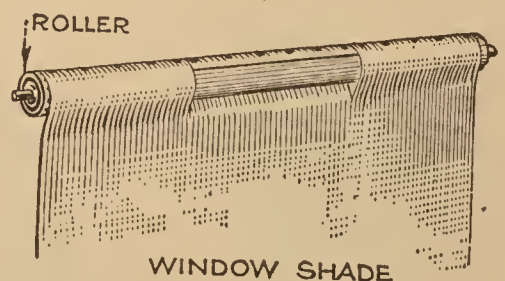
The cutter has the general appearance of a lineman's climber, although worn in a different manner. The leg iron is made from a piece of flat steel or iron, provided with loops for straps.



The steel cutter is riveted to the leg iron and sharpened on the edge toward the heel.—T. S. Stuart, Indianapolis, Ind.

To Prevent Shade Tearing from Roller

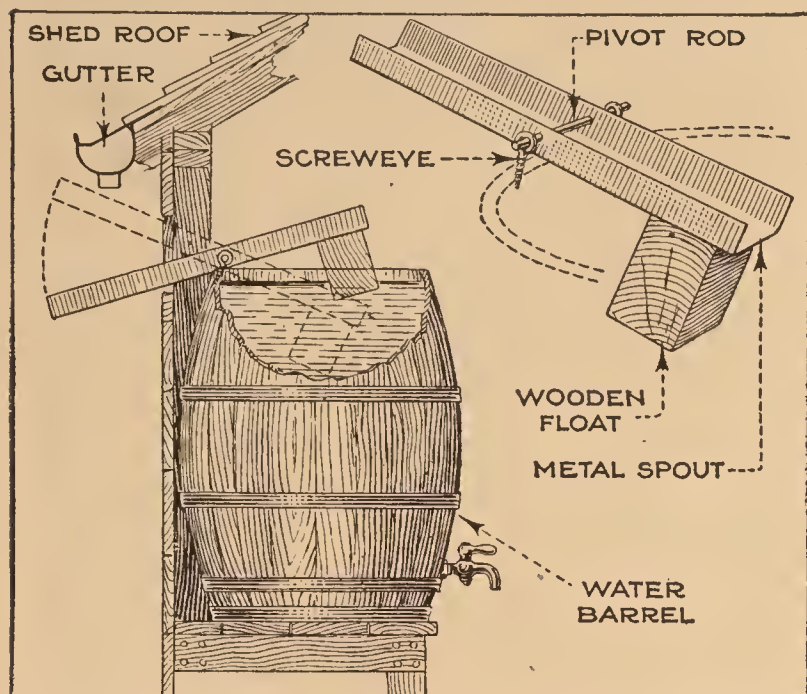
It often happens that a window shade is a little short, or is pulled so far down that the tacks holding the shade to the roller are pulled out, or the cloth is torn away from them. A remedy for this trouble consists in removing the tacks from the middle section of the shade.



Two cuts, about 3 in. long, are then made in the shade, as shown; this will form a section about one-third the width of the shade, and this section is passed to the opposite side of the roller and tacked. By this method the tacks will never come into the line of pull on the last turn of the roller, and there is always enough slack to allow easy starting again.—Chas. B. Post, New London, Ohio.

Simple Water-Barrel Regulator

In order to simplify the installation of a rain barrel and do away with the inlet and overflow pipes, as well as provide an



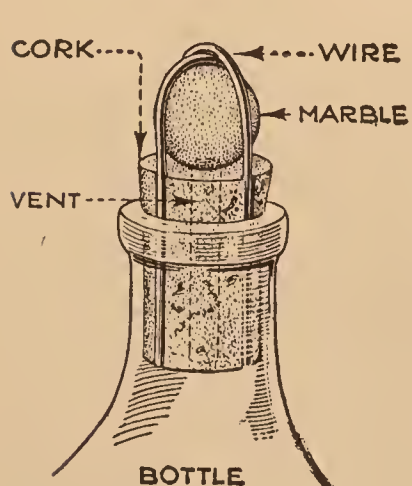
An Automatically Regulated Rain Barrel for Storing Soft Water: When the Barrel Is Full, the Auxiliary Spout Delivers the Rain Water on the Outside

automatic method for cutting off the flow when the barrel is filled, the arrangement illustrated was adopted.

A spout of sheet metal is pivoted to the edge of the barrel by means of screw-eyes and a transverse rod. The inner end of the trough is fitted, on the underside, with a wooden float so that as the barrel is filled, the float raises the spout and the water is diverted to the outside. As the water is drawn from the barrel, the outer end of the spout rises in readiness for the next rainfall.

Shaker Top for Bottles

A printer uses the device shown here-with to prevent evaporation of the gaso-line used in cleaning his type of ink.



freely. When the bottle is upright, the vent is closed by the marble, effectively preventing evaporation of the volatile contents.—Howard Lindsey, Sacandaga, New York.

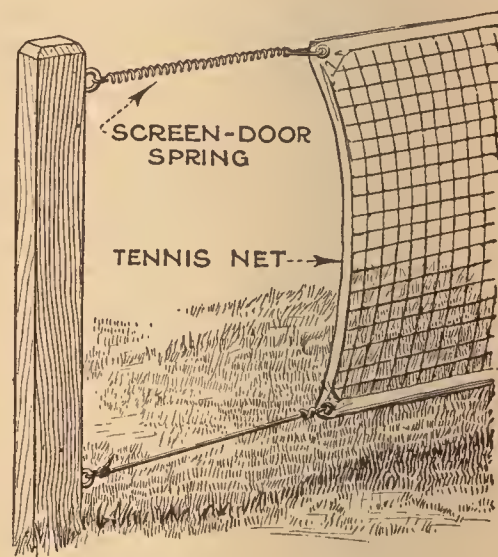
The idea is simple enough and can be applied to any vessel in which a cork stopper can be used. When the container is inverted, the marble uncovers the hole through the center of the cork so that the liquid can be shaken out

Soot Screen for Open Windows

A house cannot be well ventilated without open windows, but neither can a room be kept clean with soot and dust blowing in. Much, if not all, of the dirt nuisance can be overcome by covering the window opening with a piece of medium-heavy muslin, stretching it tightly across the window frame. The fabric is cut to fit the opening when tightly stretched, allowing an inch at top and side, to which the top parts of dress snaps or fasteners are sewed. The fixed, or bottom parts, of the snaps are fastened to the window molding, close to the sash. The cloth is then snapped into the corresponding fasteners and the screen is in place.

Holding Tennis Nets Taut

A tennis enthusiast has attached an ordinary screen-door spring to the posts on either side of his court for keeping the net stretched taut. A snap-hook is attached to the outer ends of the springs, for attaching to the eyelets in the upper corners of the net. The result of this arrangement is that the net never sags in the center, and the bother of drawing up and securing it from time to time is entirely overcome.—Chas. C. Grant, Chicago, Ill.



Repairing Carburetor Needle Valves

Failure of the carburetor needle valve to seat when depressed by the float caused an experimental temporary repair to be made, by coating the worn end of the needle with solder. The needle had been worn so that a small shoulder had formed which prevented the tapered end from seating. When coated with solder this depression was evenly filled. Instead of grinding the point to a seat, the valve was placed on the seat and tapped lightly into place.





A STEAM BOILER FOR MODEL ENGINES

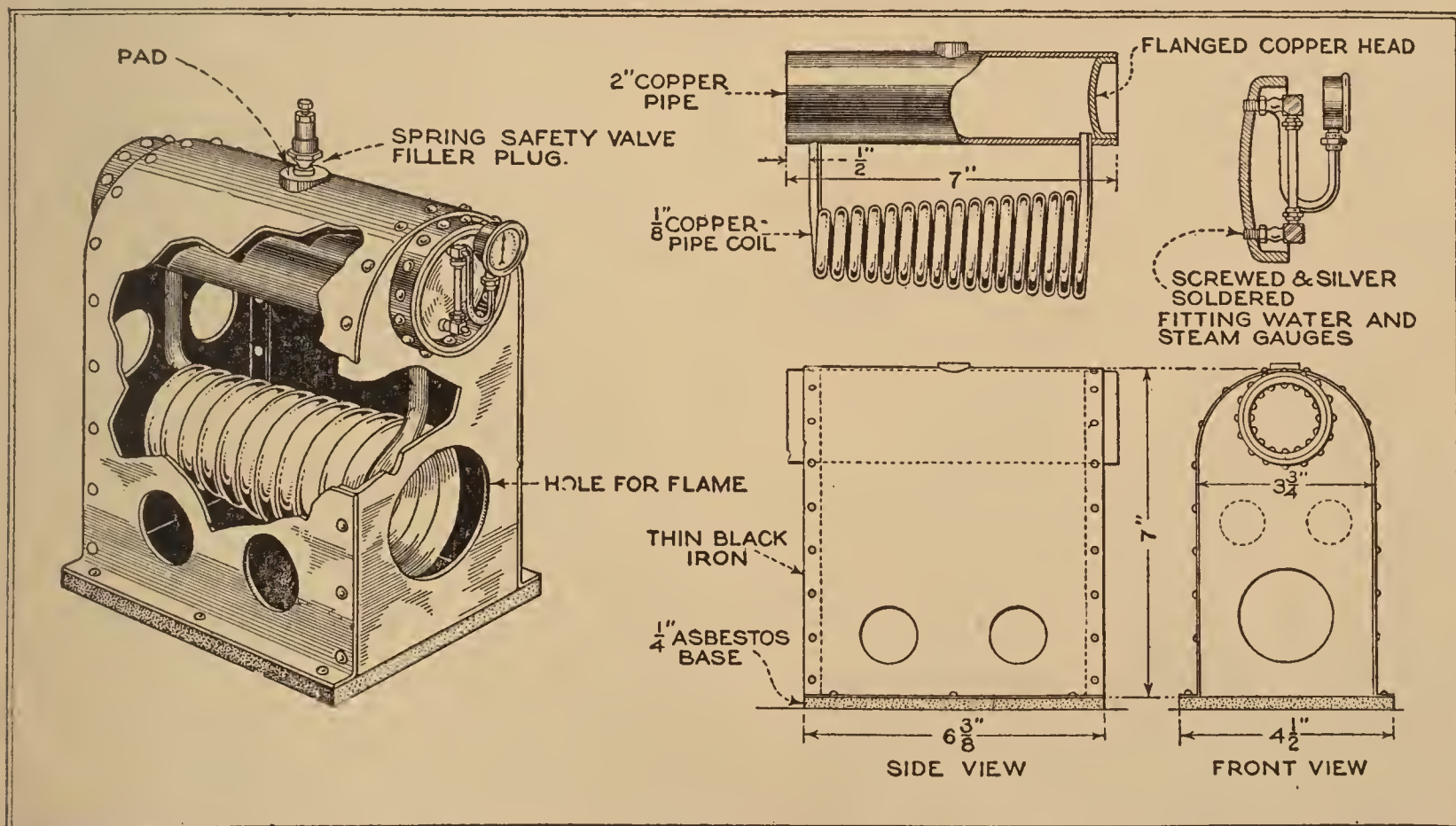
By D. M. RICE

MODEL steam engines, of either stationary or marine types up to $\frac{1}{4}$ horsepower, can be successfully operated by the miniature boiler shown in the drawing. Such a boiler is designed to be heated by a blowtorch, which makes it possible to generate the working pressure of steam in a very short time; by varying the design slightly, an alcohol lamp may be used under the copper coil, which will also give good results.

The boiler is a simple affair, although a little skill will be required to form the convex heads; these are made from disks of sheet copper, $\frac{1}{8}$ in. thick and $2\frac{3}{4}$ in. in diameter. The disks are beaten hollow

in. in diameter, and a convex face, that will fit neatly into the hollowed disk, turned on one end. A small hole is drilled in the center of each disk, and they are then fastened, one at a time, to the end of the rounded block with a small wood screw. The copper is hammered lightly along its outside edge, turning it down parallel with the sides of the block until a nicely flanged boiler head is obtained. After the heads have been flanged in this manner, the small hole in the center is stopped with a rivet and covered with solder.

The boiler shell is made from a 7-in. piece of copper or brass tube, 2 in. in



A Miniature Boiler for Model Steam Engines of Either Stationary or Marine Types: The Boiler is Heated by the Flame from a Gasoline Blowtorch Directed through the Center of a Coil of Copper Pipe Attached to the Underside of the Shell

with a light ball-peen hammer, or pressed out in a simple die. The depth of the hollow should be about $\frac{3}{8}$ in., and, if the hammer is used, care should be used in beating the metal to see that the strokes are not so heavy that the thickness of the metal will be reduced. After the proper convexity has been given to the disks, a piece of hardwood is turned down to $1\frac{3}{4}$

diameter. Drill a hole near each end to receive the ends of the copper coil, as shown. On the opposite side of the shell, rivet or braze a small metal disk, or pad, about $\frac{1}{8}$ in. thick. This pad should be filed on its underside to conform to the curve of the boiler shell, and is necessary for attaching the safety valve, as the metal of the shell is not thick enough to

permit tapping the threaded hole. A safety valve is absolutely necessary. No provision is shown for the steam outlet of the boiler, as this may be located to suit different conditions, but a pad, similar to the one described for the safety valve, must be provided for the steam pipe. Although the steam outlet may be placed in various positions, it is, in all cases, necessary to place it above the waterline, and standard practice should be followed by placing the steam pipe on top of the boiler.

The spiral copper-tube heating coil should next be made and fitted to the holes provided for the purpose on the underside of the boiler shell. About 9 ft. of copper tubing, with an internal diameter of $\frac{1}{8}$ in. will be required for this coil, which is wound around a piece of rod or pipe $1\frac{3}{4}$ in. in diameter. The mandrel is placed in a vise and 21 turns of the tubing are made around it. The coil will be improved if it is tapered, as shown in the drawing, although this is not essential. The ends of the completed coil are fitted into the holes provided in the underside of the boiler, in such a manner that they project about $\frac{1}{4}$ in. on the inside. The ends of the coil should be well brazed or silver-soldered to the inside of the 2-in. pipe forming the boiler body.

When everything else has been done in the order and manner described, the heads, which must be left to the last, are fitted into the ends of the boiler shell and

fastened with rivets. The easiest way to do the work is to fasten both boiler heads with the flanges out and with their convex faces toward the center of the shell; this arrangement makes it possible to rivet both heads from the outside with soft-iron rivets. After the heads have been riveted, both the rivets and the seam between the flange and boiler shell should be well sweated with silver solder, or brazed, to insure an absolutely steam-tight job and increase the strength.

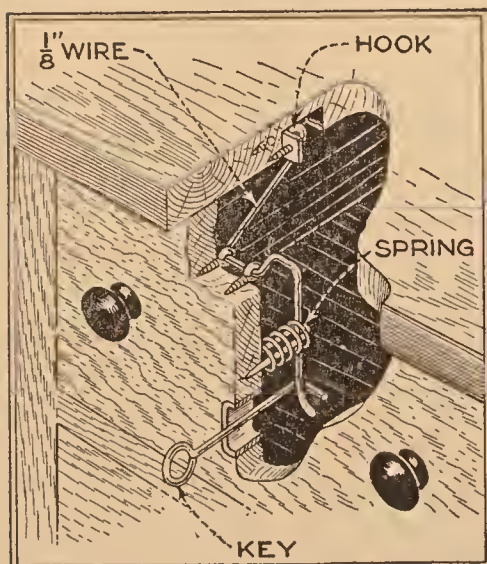
The water glass and steam-pressure gauge, which should form a part of the boiler fittings in all cases, are screwed into holes tapped in the front boiler head, and then silver-soldered or brazed.

Very little description is required for the boiler setting, which, as shown by the drawing, is made of sheet iron, fastened to an asbestos-board base.

After completing the setting, the boiler is ready for testing. After unscrewing the safety valve, fill the boiler and coil to within $\frac{1}{2}$ in. of the top with water; replace the safety valve and set it at the desired pressure, which should, in no case, exceed 50 lb. If the steam pipe has not yet been connected to the engine, remove it from the boiler and screw a plug into the steam outlet. The boiler should be heated slowly the first time, by applying the flame of a gasoline blowtorch through the hole in the front of the casing. Any small leaks which may be detected can be brazed, or stopped by calking.

Simple Lock for Drawer or Chest

A simple lock for a drawer or chest, that will make it impossible for anyone not in the secret to open the drawer



without resorting to force, can be made in a few minutes.

A piece of stiff wire is bent to the shape shown in the drawing and fastened to the inside of the drawer case with screw eyes.

A piece of spring wire is wrapped around a rod to make a compression spring, which is slipped over the staple provided for the stem of the lock; this spring locks the

drawer automatically when it is closed. A hook, bent on the upper end of the wire, fits into a slot cut in the underside of the chest top; the front of this slot is fitted with a brass wearing plate, against which the hook bears. The lock is opened by a bent-wire key, inserted into the keyhole and turned until the bent end comes over the stem end of the lock, which is pulled forward.—A. K. Harrison, Chicago, Ill.

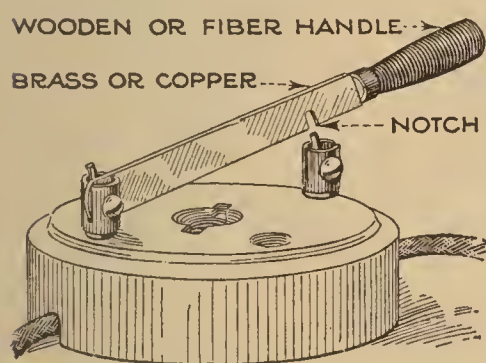
Mounting of Shade Allows Top and Bottom Ventilation

There are occasions when it is desirable to admit light or air from the top of the window, which is impossible with the ordinary arrangement of the window shades. A simple method by which this is made possible is to mount the shade roller across the middle of the window opening. The blind is removed from the roller, folded in the middle and tacked on again at this point. This arrangement will make it necessary to hem the plain end so

that a stick or rod can be inserted. A weighted cord from the upper end of the blind passes over a pulley, or through a screweye, in the top of the window frame, and serves to hold the shade taut. The curtain is operated from the bottom of the window, as usual, but when the lower half of the blind is pulled down, the upper part will be pulled toward the top by the weight, and when the lower half is rolled up, the upper section will also be wound around the roller. An arrangement of this sort makes it possible to ventilate a room from the top as well as the bottom of a window.

Knife Switch Made from Old Snap Switch

When snap switches become so worn that they are beyond repairing, a knife switch can be made from the porcelain



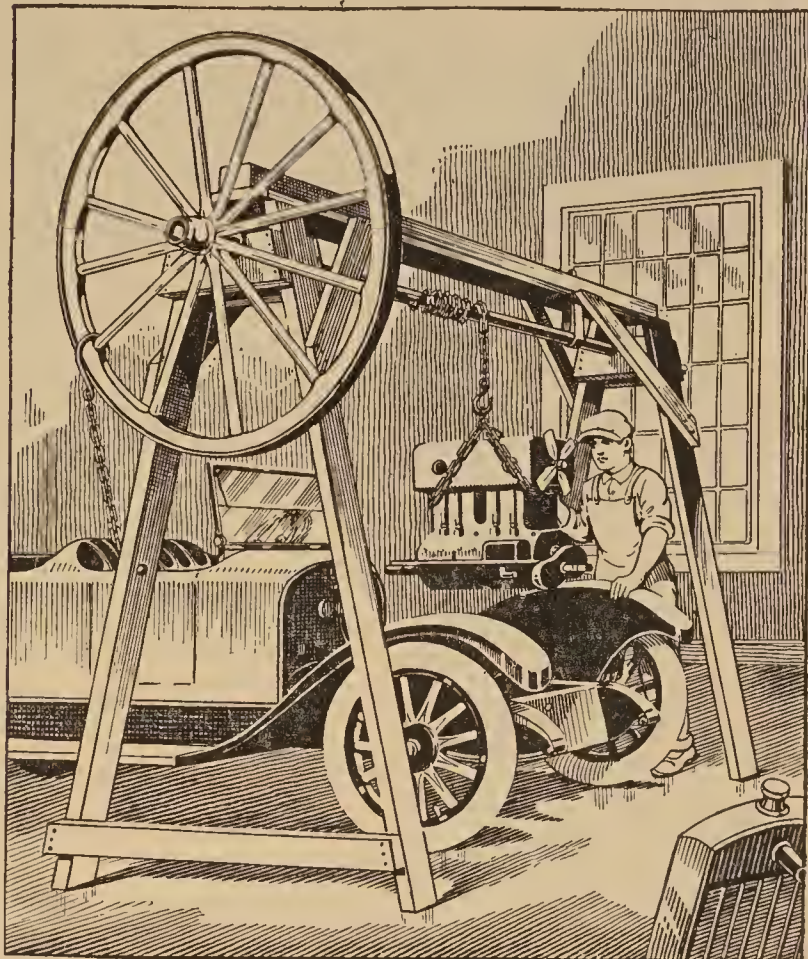
base and terminals that remain after other parts have been removed. Such a switch will prove quite an acceptable article in experimental

work. The old center of the original switch is removed and discarded, as are also the spring clips on each terminal. A piece of brass or copper, about 3 in. long, is made into a switch blade, and provided with a wooden or fiber handle. A hole is drilled at the end for the terminal screw, and a notch is cut in the edge just back of the handle, to fit over the terminal screw on the opposite side. Slots must also be cut through the center of each terminal, for the switch blade.

Repair-Shop or Farm Hoisting Gear

For hoisting automobile engines from their chassis, lifting bodies, and other heavy work, an automobile repairman uses the hoisting arrangement shown in the drawing. The main structure is of wood, with a piece of heavy 3-in. pipe supported on wooden bearings, parallel with the horizontal crosspiece. An eyebolt, to which one end of the hoisting chain is attached, is fastened to the center of the pipe. An old wagon wheel is pinned to the outer end of the pipe and provides a means for turning the pipe and winding up the chain. This arrangement produces a powerful leverage. A holdfast for retain-

ing the hoist in any position is provided by a short chain and hook fastened to the woodwork, the hook being slipped over one of the spokes in the manner shown.

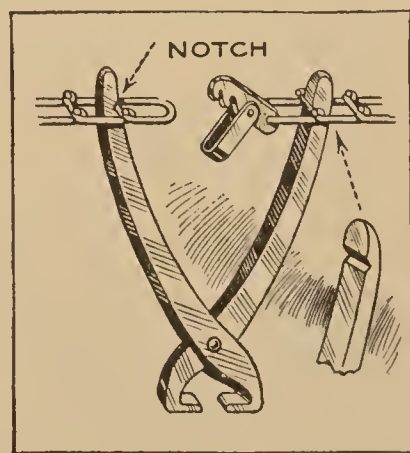


This Simple Windlass Arrangement Consists of a Wagon Wheel Pinned to the End of a Piece of Heavy Pipe, Which is Supported on Wooden Bearings

Iron straps, in addition to the bearings, are provided, for supporting some of the weight of the load on the pipe. The usefulness of this device is not confined to the shop. It will be found exceedingly handy around the farm, for lifting wagon tops, or other heavy work.

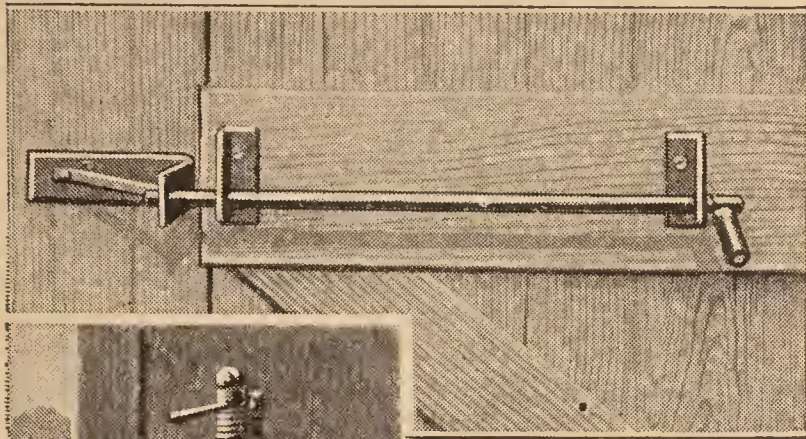
Applying Auto-Tire Chains

Automobile users are familiar with the trouble encountered in applying a set of antiskid chains tightly enough to prevent them from coming off the tire or striking the fenders. The drawing shows how the ends can be fastened together with the tire-chain repair pliers, which should form a part of the car's tool equipment. A notch is filed on the inner side of each of the handles, which are inserted into the chain links as shown. The handles of the tool are then pressed together and the fastener hooked. —George Elleson, West Allis, Wis.



Holding Garage Doors Open

All manner of devices are used to prevent the garage doors from blowing shut while the car is in the opening; the two



Two Devices Used to Prevent Garage Doors from Blowing Shut When the Car Is in the Door Opening: The Upper One Holds the Door to the Wall, While the Other Engages in a Hole in the Floor

shown in the illustration, however, have the merits of strength and ease of operation. One is an all-

metal fastener, which requires an angle iron fitted to the outside wall of the garage, but which works independently of the ground and floor. Instead of a simple hole in the angle iron, it is better to make a vertical slot to allow for sagging of the door. The other, a lighter fastener, consists of a piece of hardwood curtain pole, with a coil spring, to keep it up when not in use. When the door is to be held open, the rod is pushed downward, so that a metal pin driven into the lower end engages in a hole in a small block of cement which is imbedded in the ground. A pin in the top of the pole catches into a notch in an iron plate, when pushed down to hold the door; the other end of this pin forms a handle for swinging the rod around, to release it from the notch.

The Use of Lacquers

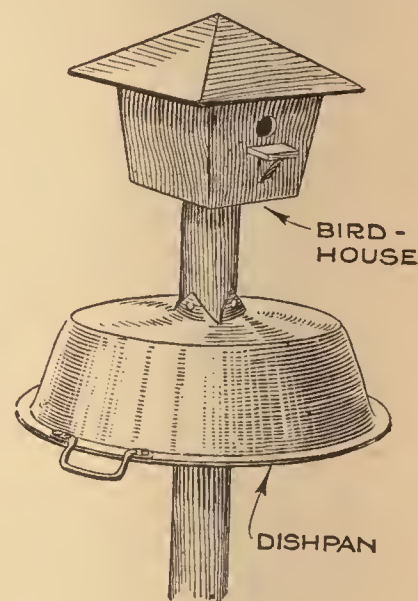
There are two kinds of lacquers on the market—dip and brush. A dip lacquer is made in such a manner as to give the best results when the articles are dipped in it. Brush lacquers are intended to be applied to the work with a brush, and do not give satisfaction when used for dipping. To produce the best results it is necessary to use a lacquer that is made especially for the kind of metal on which it is to be

used. As a general rule, brass lacquer is colored yellow, while one used on silver articles is colorless. Lacquers should not be rubbed onto the work, like paint, but should be flowed on, like enamel, so as to obtain as smooth a finish as possible, without brush marks showing. After the work is done, all the brushes should be wiped on old newspapers until they are as dry as possible, cleaned with turpentine, and put away where they will not accumulate dirt.—W. S. Standiford, Youngstown, Ohio.

A Dishpan Cat Guard for Birdhouse

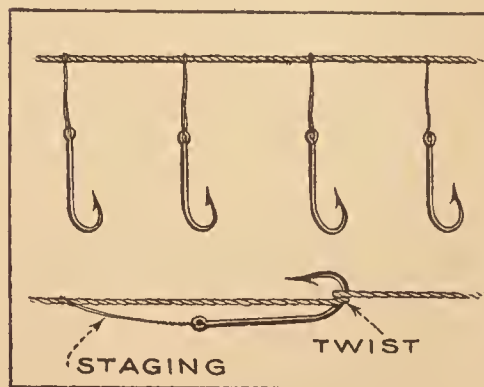
To protect birdhouses and feeding tables from the raids of cats, an effective guard can be made from an old dishpan.

The pan is turned bottom up, and three slits are cut in the center, the metal between the cuts being turned back to form ears, by means of which the device is nailed to the pole. When the birdhouse is protected in this manner, a cat or other marauder cannot reach the top of the pole and disturb the bird residents or visitors.—L. B. Robbins, Harwich, Mass.



Taking Up a Trot-Line

When taking up a trot-line, the usual result is a bad tangle of hooks and line, which is difficult to avoid unless the staging is removed entirely. The drawing shows a method that entirely overcomes the trouble. Each staging is



pulled tightly along the line, and the cord is given a single twist around the hook. After all the hooks have been treated in this manner, it is a simple matter to wind up the whole line without danger of tangling; when the line is set again, all the hooks will be in place and there will be no snarls.

Cleaning Auto-Starting Gears

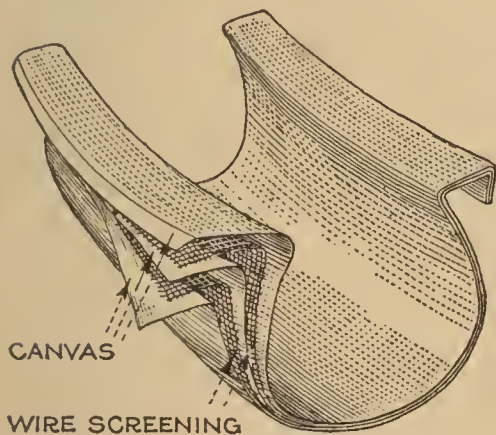
The pinion and driveshaft of the starting motor on most automobiles are usually neglected by the owner until the day comes when they refuse to turn over the engine.

The usual symptom of a dirty drive is the humming of the starting motor, without the engine being cranked, when the starter button is pressed. This is caused by dirt or even heavy oil getting on the driveshaft, and preventing the pinion from screwing out and meshing with the teeth on the flywheel. Generally, it is only necessary to remove the floorboards to expose the starter pinion and flywheel, and then wipe off as much dirt as possible with a clean rag. If a blowtorch is at hand for spraying gasoline, it can be used to clean the driving mechanism thoroughly. Gasoline applied with a brush will also remove all accumulated dirt and gum. After the gasoline has evaporated, oil the mechanism with a small quantity of very light oil. This part of the car should be cleaned at least once a year.—G. W. Greene, Madison, Wisconsin.

A Long-Lived Blow-Out Shoe

Most blow-out shoes, when used inside a tire, have a tendency to blow out through the tire, as soon as one or two

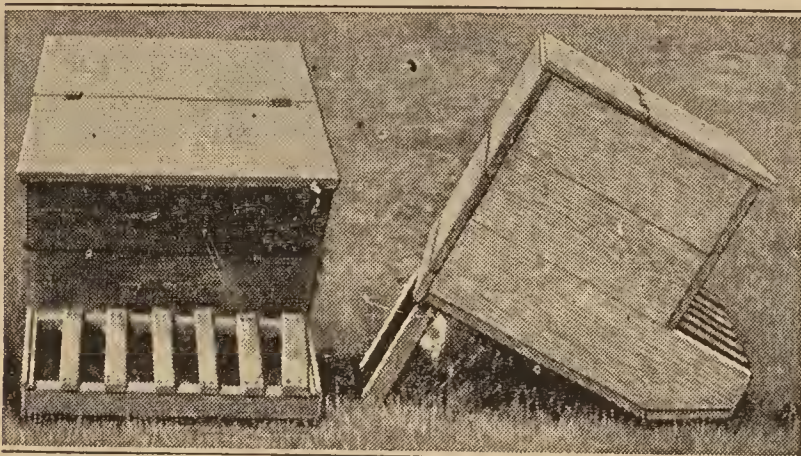
layers of the fabric have been worn through. This trouble was overcome, in one instance, as follows: Two thin blow-out shoes were laid together,



with a layer of steel screening, which is somewhat finer than common screen wire, between them. The wire layer was held in place by sewing it to one of the shoes with waxed shoe thread, after which the two shoes were cemented together. The edges of the shoe that projected under the tire were fastened together at several points with split rivets. This reinforcing was found to impart superior wearing qualities. Later a homemade patch was made, along similar lines, from three layers of heavy canvas with a layer of wire between them, as shown in the drawing, the whole being cemented together, to prevent creeping.

Self-Feeder for Poultry

Every poultry raiser or farmer who keeps poultry knows the advantages of a self-feeder, and the pictures show how

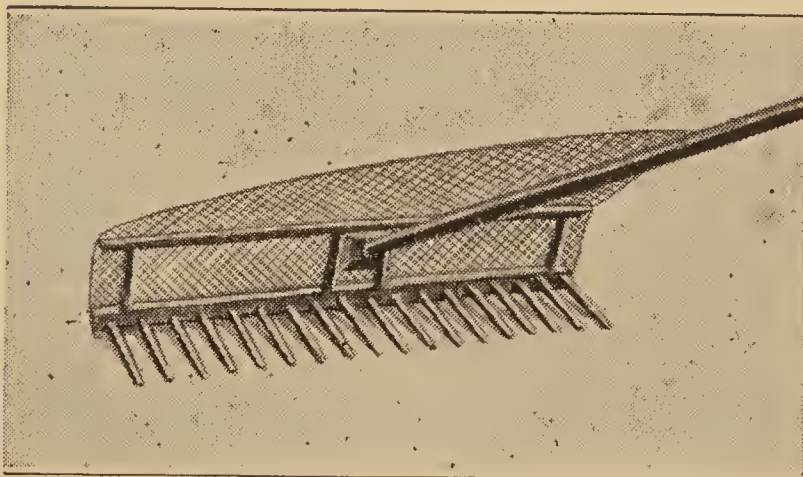


Front and End Views of a Poultry Feeder That can be Made at Little or No Expense: The Back is Elevated So That There will Be a Constant Supply of Feed at the Front

such an article can be made from an old box or scrap lumber. This feeder is 2 ft. wide, 2½ ft. long, 2 ft. high at the front and 2½ ft. at the back. By elevating the back in the manner shown, there is always a constant supply of feed at the front, which is not always the case if the feeder is set level.—H. J. Engel, New Braunfels, Texas.

An Improved Leaf Rake

A rake which is especially useful for raking leaves from the lawn is shown in the illustration. It can be made from a



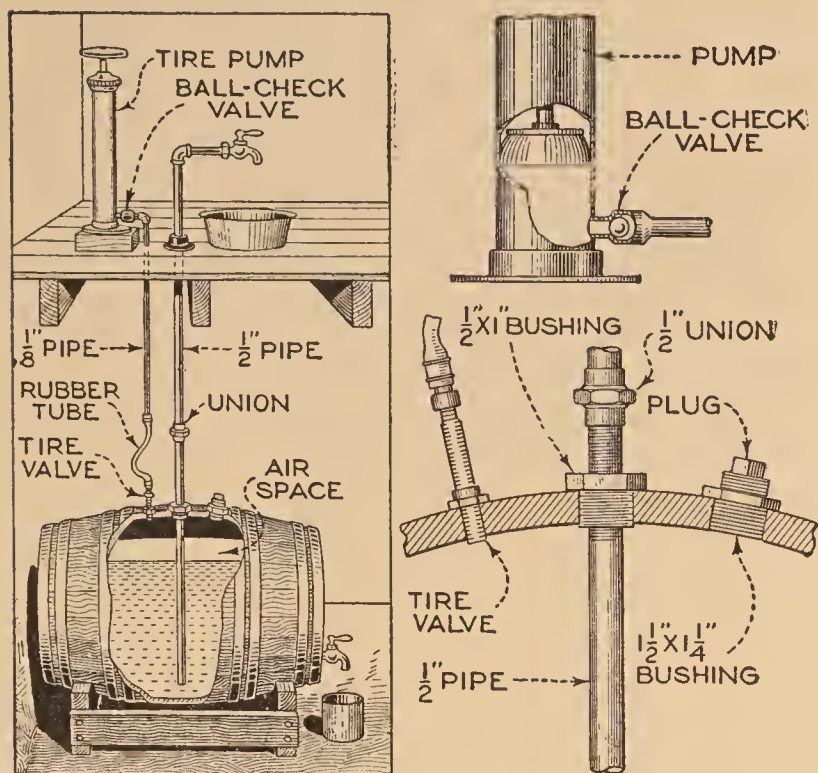
A Rake Which does Not Dig into the Ground Is Especially Useful in Cleaning a Lawn of Dead Leaves

common wooden rake, which has one edge planed to a slight bevel; on this edge is built a light framework to carry the handle, as shown.

The bevel throws the teeth slightly downward, so that the points just touch the ground. To prevent the accumulated leaves from flowing over the back of the rake, a piece of wire netting is tacked over the frame, a section being brought over and fastened to the handle.—H. N. Posz, Winona, Minn.

Dispensing System for Oils and Other Liquids

A country resident bought his kerosene oil, for illuminating and cooking purposes,



An Oil-Elevating System, Used by a Householder to Draw Off Supplies of Kerosene for Domestic Purposes: It can be Applied to Good Advantage in Garages and Shops

by the barrel, and kept it stored in the basement. In order to make it convenient to draw a supply of fuel from the barrel without descending to the basement, the arrangement illustrated was used to raise the oil to the upper floor.

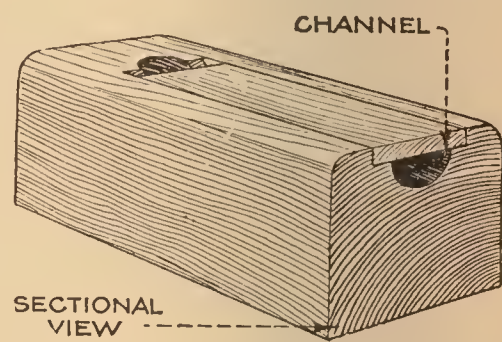
A sound, tight barrel was set in a wooden cradle and three holes were drilled in the top of the vessel. The one in the exact center of the bilge was $\frac{7}{8}$ in. in diameter, another hole, 6 in. to one side of the center was $1\frac{3}{8}$ in. in diameter, and another on the opposite side of the center was made small enough to accommodate an ordinary tire valve. The large holes were threaded for reducing bushings, as shown, the $1\frac{1}{2}$ by $1\frac{1}{4}$ -in. bushing screwed home, and a plug screwed into it. The plugged hole was used for filling the barrel. The discharge line consisted of a piece of $\frac{1}{2}$ -in. pipe, 6 in. longer than required to reach the bottom of the barrel. One end of this pipe was threaded for a distance of 8 in. and the 1 by $1\frac{1}{2}$ -in. reducing bushing screwed on, so that the threaded end of the pipe projected at least 6 in. above the flange. The pipe was inserted into the oil barrel to within an inch of the bottom, and the bushing screwed home. A tire valve was threaded into the smallest hole, all joints and threads being coated with white lead to insure tightness. The oil was conducted to the upper floor by the piping arrangement illustrated. Air

pressure was used to elevate the oil to the outlet and this was provided by means of an ordinary automobile tire pump. A ball-check valve was connected to the base of the pump to prevent escape of the air. The pump stirrup was then bolted to the floor, and the air outlet conducted to the tire valve on the barrel as shown.

In use, the barrel was never completely filled, an air space of about 2 in. being allowed in order to create pressure. Then, when oil was desired, a few strokes of the pump created the necessary pressure to raise the fuel when the stopcock upstairs was opened. About $\frac{1}{2}$ lb. of air pressure should be allowed for each foot the oil is to be raised.

Miteless Poultry Roost

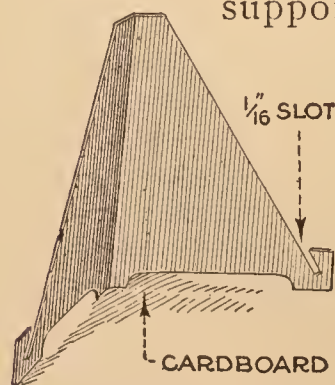
A piece of 2 by 2-in. material is molded as shown in the drawing, with a semi-circular groove. A strip of wood, about $\frac{1}{4}$ in. thick and wide enough to cover the cavity, is glued into a recess cut in the top, as shown. This leaves a covered chan-



nel which extends to within 1 in. of the ends of the roost. The groove is filled with kerosene from time to time, and this effectively prevents mites from reaching the fowls. The pores of the wood will soon become saturated with the oil, and none of the parasites will go near the roosts.

Easel for Showcards and Photos

By using a triangular piece of cardboard, a neat and inconspicuous easel for supporting photographs, show-



cards, and similar articles, can be easily made. The cardboard is folded in the center, and, if heavy stock which is liable to break, is used, a strip of muslin can be glued over the crease. Slots are cut into projections left on the bottom corners, and care must be used in cutting these, to prevent the projections from breaking off. In use, the article to be displayed is placed in the slots, after the easel has been bent.—Eugene O. Blessing, San Francisco, Calif.



A PORTABLE RADIO RECEIVER

By F. L. BRITTIN

BOY scouts and other outers, who desire a portable radio-receiving set that has a receiving and tuning range beyond the usual crystal-detector instruments, will find that the single vacuum-tube apparatus described in this article meets their requirements. Honeycomb inductance coils are used so that the set can be tuned to any damped or undamped wave length between 200 and 15,000 meters.

At the outset it should be understood that no restriction is placed on the ingenuity of the individual builder, in adding features or refinements that he may deem necessary or desirable, and the dimensions given for the panel and other parts may be altered in any way to suit the available space. The original set was built into a school case, which is a miniature suitcase, having inside dimensions of $5\frac{1}{2}$ by $11\frac{1}{2}$ by $14\frac{1}{2}$ in. The bakelite panel is set in $\frac{1}{2}$ in. from the edge of the open case, so that there will be plenty of clearance for the knobs and switches when the cover is closed.

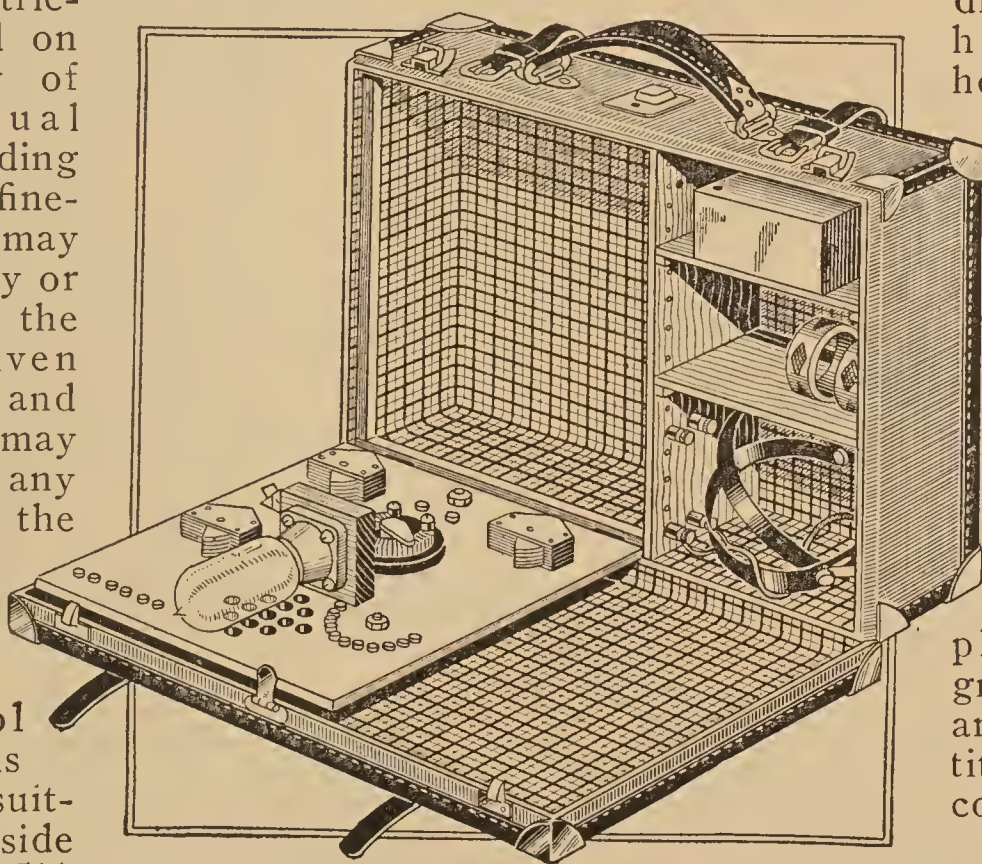
The panel is held in place inside the case against $\frac{1}{2}$ -in. square wooden strips and the edge of the wooden partition. Small brass hinges are used for hinging the panel to the lower strip, and a cabinet catch is placed at the top; this arrangement makes it possible for the operator to swing the panel out at will, to get at the circuit or back-mounted instruments. The remainder of the space, at the right of the partition, is divided by shelves into

compartments for the B-battery, honeycomb inductance coils, and headset. The upper shelf is for the B-battery, which may consist either of 10 three-cell flashlight batteries or a standard unit; if flashlight batteries are used, they should be taped together with friction tape, connected in series, and tapped off to the B-battery switch on the panel. Small flexible lamp cord is used for the battery connections, and these are led through holes drilled in the partition. The mid-

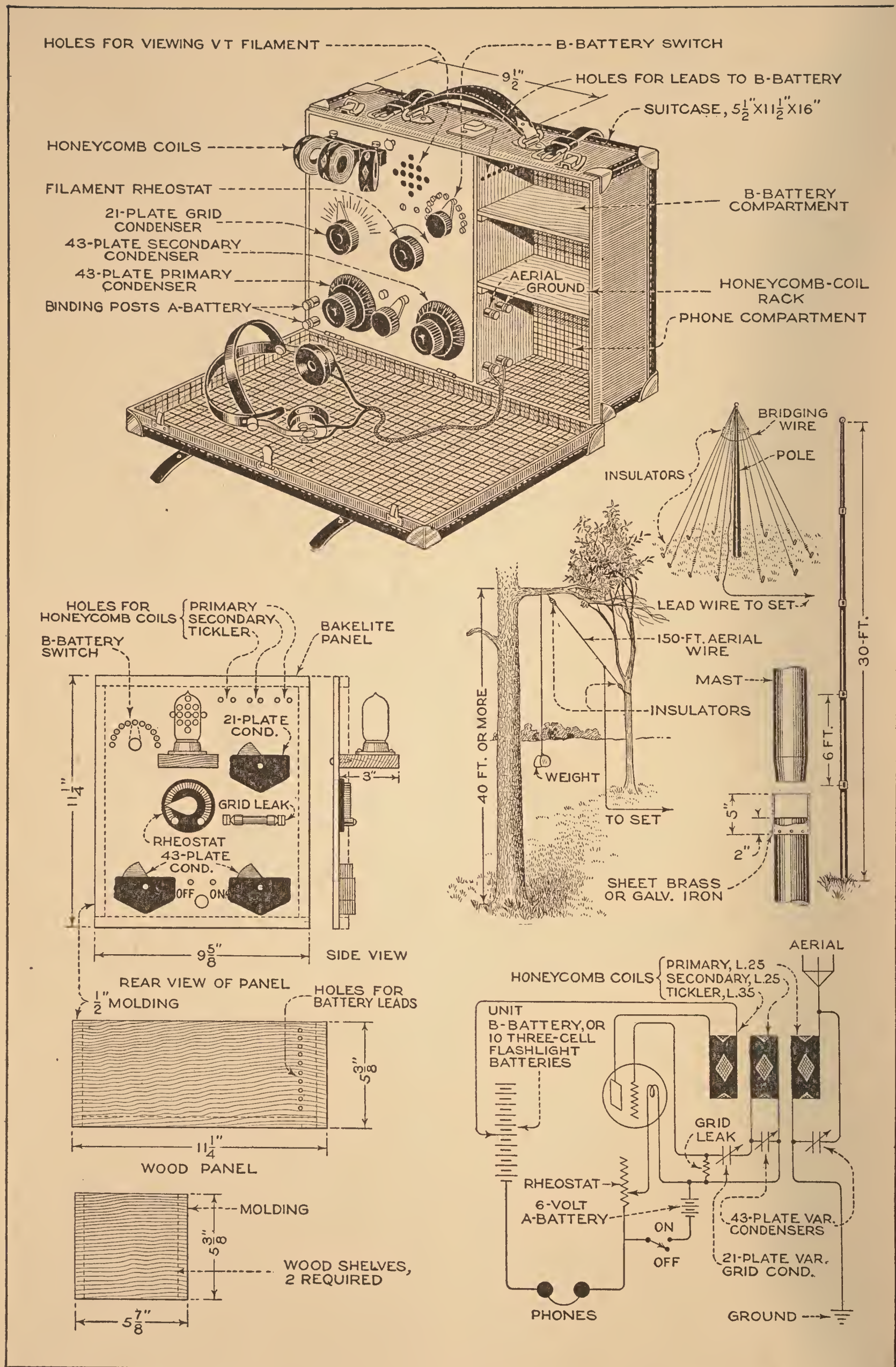
dle shelf holds the honeycomb coils; holes are drilled in the shelf to take the plugs, so that the coils are carried upright, and without rattling. The telephones are carried in the bottom compartment, free from possible knocks and jars, on a piece of felt glued to the bottom. The phones, aerial, and ground binding posts are shown on the partition in the phone compartment.

The necessary instruments can be mounted in various ways, but the arrange-

ment shown in the drawing is a very neat one, with the two 43-plate condensers and switch at the bottom, the 21-plate condenser and filament rheostat in the middle, and the B-battery switch holes for viewing the vacuum tube, and inductance at the top. The 43-plate condensers should have a capacity of .001 mf. each. The 21-plate grid condenser should have a capacity of .0005 mf. The honeycomb inductances are mounted on a standard mounting unit, which allows the coils to be swung back and forth to vary the coupling; these coils must, of course, be removed when the case is closed. A



Panel Let Down Flat, Showing Back-Mounting of the Condensers, Rheostat, and Vacuum-Tube Socket



A Small Vacuum-Tube Radio Receiver for the Use of Boy Scouts and Campers: With the Proper Coils, the Wave-Length Range Is from 200 to 15,000 Meters. Two Types of Aerial, with the Method of Erecting, are Shown in the Right Center

standard 2-megohm grid leak is placed just above the switch, and the vacuum tube is mounted on a standard base, screwed to a wooden block that is fastened to the panel with two screws; tube sockets for mounting directly to the panel are available as an alternative to the method described. The wiring is No. 16 rubber-covered fixture wire; all joints should be soldered, and no more wire used than is absolutely necessary. The binding posts for the A-battery are shown in the lower left-hand corner of the panel; this battery is for lighting the filament in the VT-tube and four or five ordinary dry cells will answer, or, if an automobile is handy, the necessary current can be drawn from the storage battery. The phones should be wound to at least 2,000 ohms' resistance. In buying the several instruments for the panel, get short, flat knobs for the condensers and rheostat; for space is at a premium, and this should be kept in mind throughout the assembling of the set.

The simple wiring circuit is clearly

Warming Up the Auto

When starting up the car on a frosty morning, or at any other time after the engine has become cold, when there is a persistent popping at the carburetor, and lack of power in the engine, a simple expedient is to place a piece of newspaper over the front of the radiator. The suction of the fan will hold the paper against the radiator, and, after a few minutes of running, the engine will attain normal operating temperature.

Making a Toy Water "Scooter"

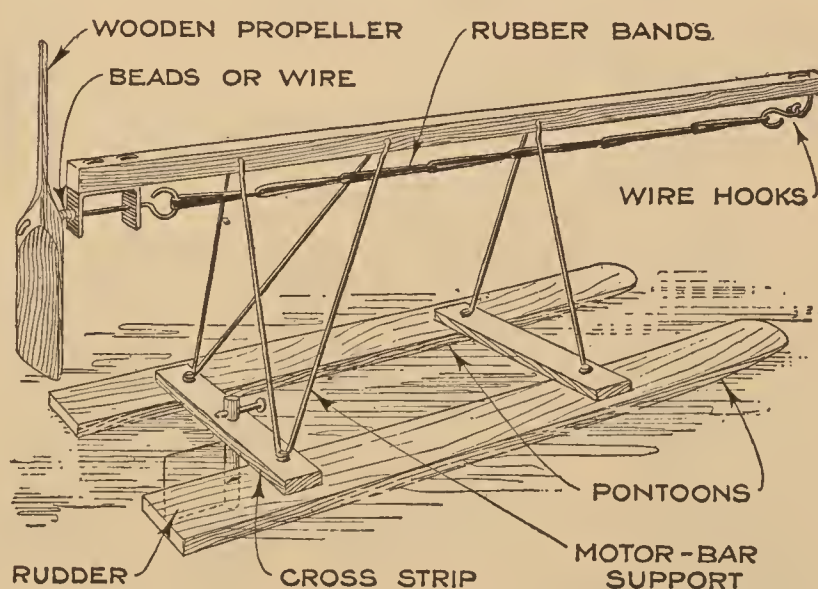
The drawing shows a water "scooter" that can easily be made by the average boy from a few bits of light board, some stiff wire, and a handful of rubber bands. The pontoons are tapered at the stem of the craft and are held the right distance apart by cross strips. The propulsive mechanism of the scooter is mounted overhead. The propeller is the most difficult part to make, and possibly some experimentation will be necessary to get the most effective result; however, the important thing to remember is, that it must be balanced accurately and lined up well to insure smooth running. It is mounted on a wire shaft supported by a tin bracket, but before assembling the propeller in its bearing, a few beads or a few loose turns of wire should be slipped over the shaft,

shown in the drawing, and, if carefully followed, will give excellent results.

The best outdoor aerial is a No. 14 copper wire, or stranded phosphor-bronze wire, 150 to 200 ft. long, with a small insulator (not porcelain) at each end. A piece of light rope, with a weight fastened to one end, is tied to one of the insulators and thrown over the limb of a tree as far as possible above ground, care being taken to have an open space free from obstruction for stretching the wire. The other end of the aerial is tied to another tree, about 5 or 6 ft. from the ground, and a lead wire to the set is soldered in place.

The umbrella type of aerial shown is generally used in the army signal corps for field work, but is more complicated. The wires are brought out from a common point from the top of the jointed mast and staked out from insulators. A 6-ft. iron rod driven into the earth makes a good ground for both types; if a stream is near by, the end of the ground wire can be weighted and submerged.

as indicated, to provide clearance. The actual power is furnished by a long rubber strip, or a number of rubber bands looped together, the rubber strip thus ob-

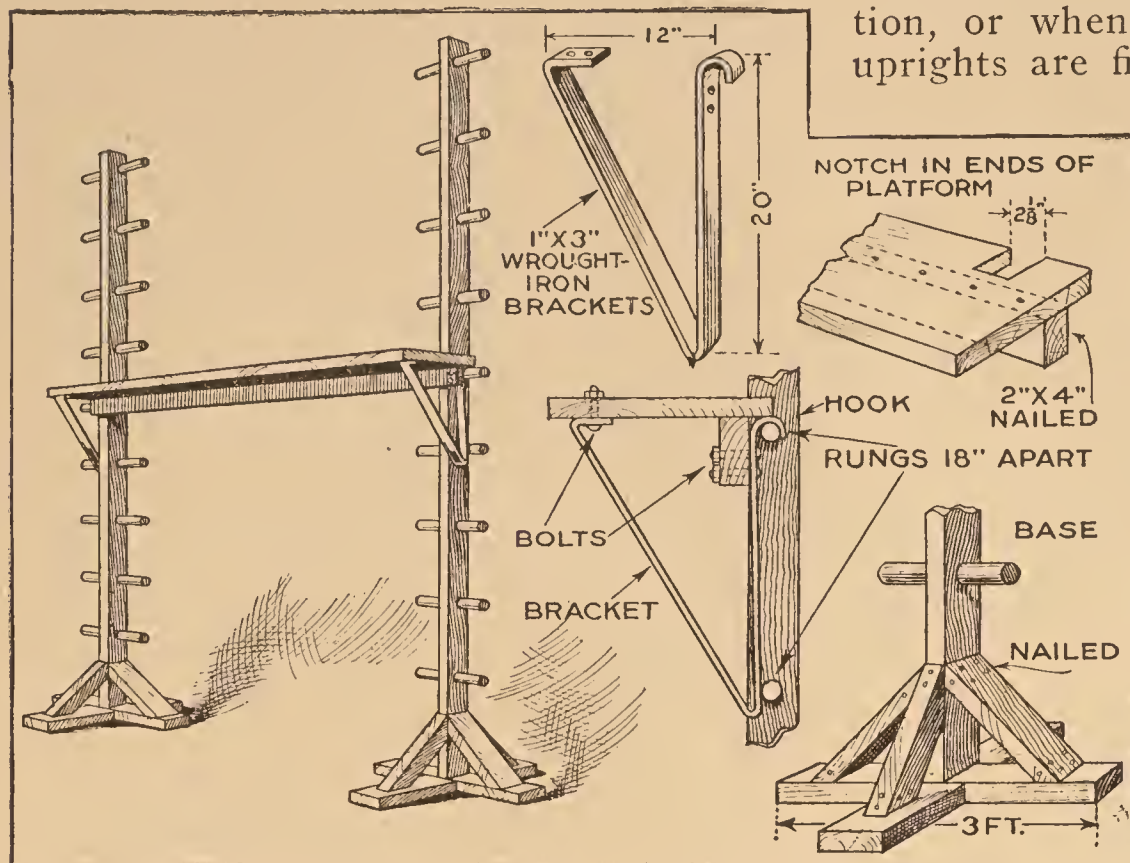


A Water "Scooter" Driven by a Rubber-Band Motor, That can be Easily Made from Light Strips of Wood, Is Capable of Good Speed for Voyages That Average About 50 Feet

tained being dusted with talcum powder and fastened, at one end, to the propeller, and at the opposite end to the overhead wooden strip, as shown. Powerful rubber bands can be cut from an old inner tube. If desired, a rudder may be added to the boat so that it can be made to travel in a circle instead of a straight line. Such a scooter, lightly constructed and with a sufficiently powerful rubber-band motor, will travel at good speed for about 50 feet.—D. W. Clark, Buffalo, N. Y.

An Adjustable Portable Scaffold

A portable scaffold that is light in weight, simple in construction, and readily



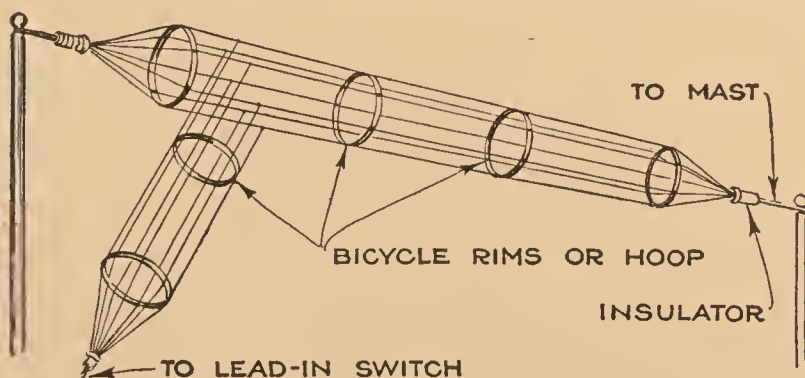
A Portable Scaffold That Is Light Yet Substantial, and That can be Adjusted to Varying Heights: The Uprights can be Used Separately, as Ladders, When Necessary

adjustable, is made in the manner indicated in the drawing.

The scaffold uprights are built of 2 by 4-in. lumber, and can be used individually as ladders for setting the horizontal section, or when moving it higher. These uprights are fitted with rounds of $\frac{3}{4}$ -in. pipe or 1-in. oak, about 9 in. long, and the 3-ft. crossbars at the lower ends make the scaffold as stable as the usual ladder. The platform is a 12-in. plank with a 2 by 4-in. piece nailed near one edge, as indicated in the drawing. Wrought-iron brackets, provided with a hook at one end to catch over the projecting rounds of the uprights, are bolted to the ends of the platform, and notches are provided in it, to fit around the uprights, and prevent the platform from shifting sidewise.—G. A. Luers, Washington, D. C.

New Type of Cage Antenna for Radio Stations

The cage type of aerial is gaining considerable favor with commercial and amateur operators, as it is easy to construct, economical in the number of insulators required, eliminates much trouble due to poorly soldered joints, occupies less space, and offers less resistance to the wind than the old flat-top type. Height is essential in this type, as the lead-in is also of the cage type, which adds to the capacity of the aerial. With this kind of antenna and lead-in it is possible to get greatly



The Cage-Type Aerial is Highly Recommended to Amateurs, as It Is the Most Efficient Type for Stations Operating on a 200-Meter Wave Length

increased range of radiation on 200 meters. A good ground system is required, and good results cannot be obtained without giving as much attention to the ground-

ing as to any other detail of the transmitting equipment. Either a suspended counterpoise or buried ground should be used, the latter being formed by burying 60-ft. lengths of No. 14 bare copper wire in the ground, the wires being laid to radiate fanwise under the aerial. This size bare copper wire is also used in the construction of the cage aerial, and a long insulator is used at each end of the cage; the spreaders or hoops are made of heavy wire, or discarded bicycle rims, which are light and strong, can be used, the separate wires forming the cage being secured to the hoops by several turns of wire, and then soldered. The ends of the wires are brought together, carefully soldered, and fastened securely to the insulators. The lead-in wires are soldered to the cage wires, and too much emphasis can hardly be placed on the necessity of careful soldering, as loose joints greatly reduce efficiency. All guy wires should be "broken up" with small insulators. The masts that support the aerial should both be of the same length so that each end of the aerial will be the same distance from the ground.

■ A small lump of sealing wax can be used to take the place of broken typewriter keys.

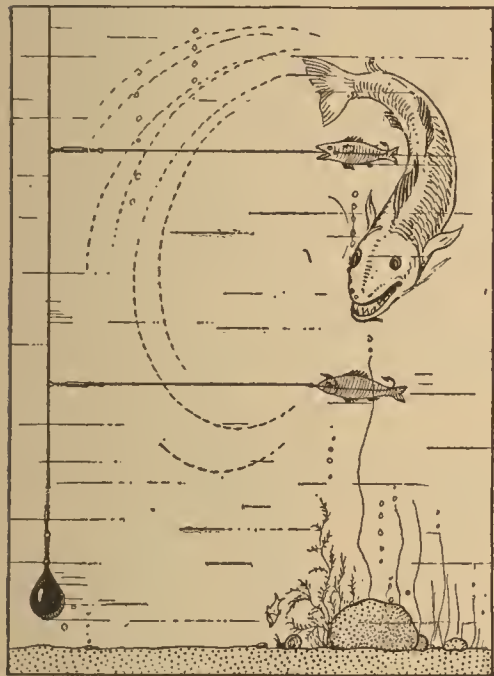
Bathing-Cap Ornaments

The ordinary soft-rubber bathing cap may be decorated with designs and monograms cut from the cementless rubber-patch material that forms a part of the equipment of practically every motorist, or which can be obtained for a small sum.

The design is penciled on the stock, then cut out with a pair of sharp scissors or a knife, and applied to the cap in the same manner as when patching a tire.—Harold McMahon, Hatchville, Mass.

Trolling Rig for Autumn Lake Trout

Lake trout strike best in the autumn, and the drawing shows a method of getting down to them that will commend



itself to the angler. This fish as well as others, such as the wall-eyed pike, are found in deep water, and unless the lure is dropped deep no results are obtained. The main line is weighted at the bottom with an 8-oz. pear-shaped dipsey. The

branch lines are connected to the main one, at intervals of about 4 ft., by swivels, which prevent kinking and twisting. The minnows are fastened to the double hooks in the manner shown. The bottom depth is now found and the surface point marked on the line, so that the fisherman can troll some 3 or 4 ft. off the bottom.

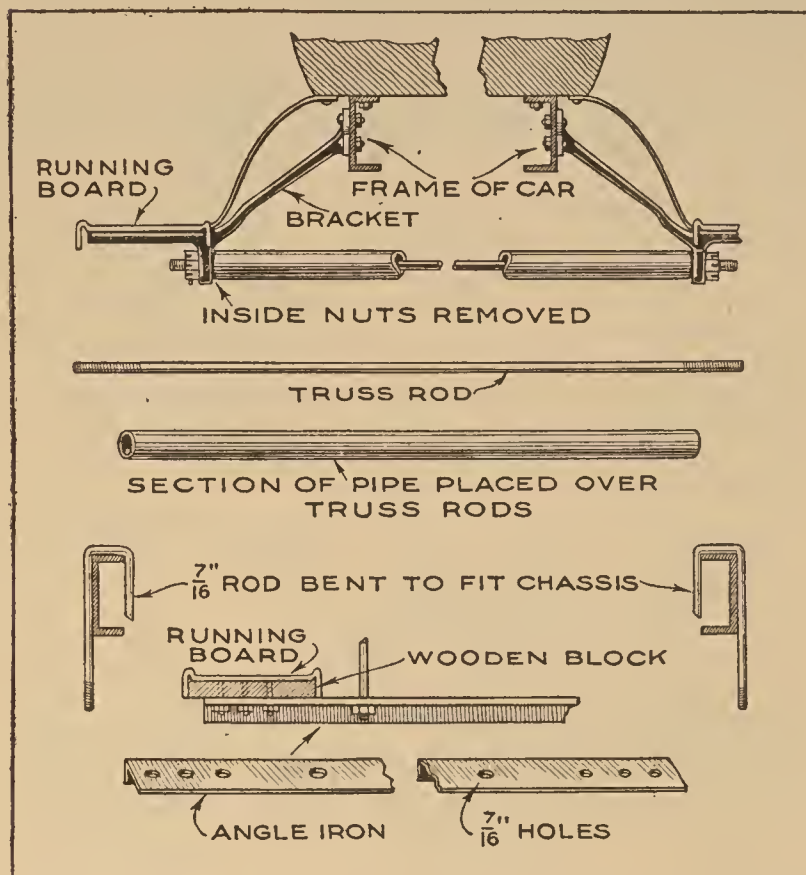
Overcoming Sagging Running Boards

The tendency of the running boards of a light automobile to sag down can be largely prevented by reinforcing the brackets by a horizontal brace underneath the car.

Referring to the drawing, it will be seen that a suitable length of pipe, placed over the truss rods, can be used to make a substantial brace and prevent bending of the running-board brackets—the real cause of sagging running boards.

A more substantial method, and one that gives greater rigidity, involves con-

siderably more work, justified, however, by the results. A piece of stiff angle iron is bolted to the running boards, a hardwood block being interposed, as indicated,

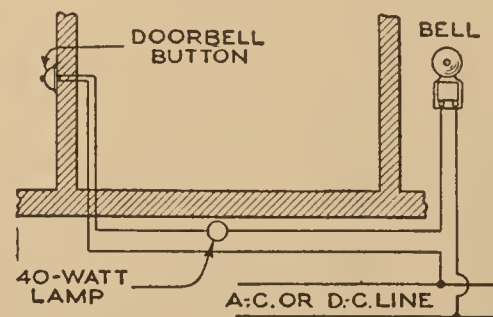


Two Systems of Reinforcing the Running Boards of a Light Car to Prevent Sagging: The Braces Also Permit the Carriage of Additional Weight on the Running Board

as a bearing for the ends of the brace. Two iron hooks are formed like the ones shown; these fit over the side channels of the chassis, with the threaded ends fitting into holes in the brace; they are drawn up tightly and locked with a castle nut and cotter pin.

Using Bell on Lighting Systems

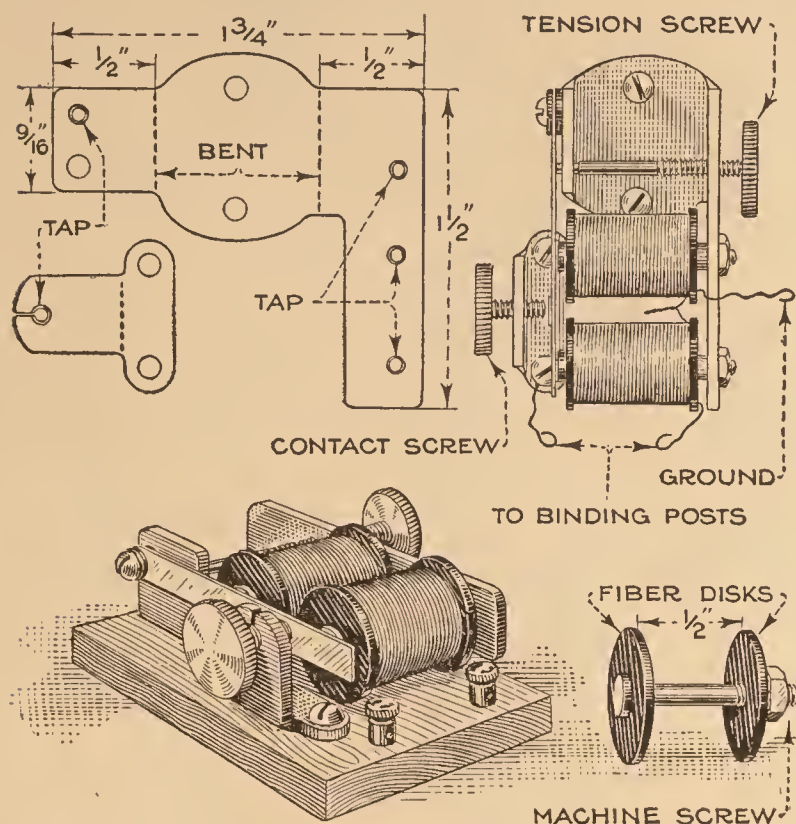
The drawing shows a method by means of which an electric doorbell is rung by current from the house-lighting system, without the use of a transformer, the necessary reduction in the strength of the current being obtained by the interposition of a 40-watt lamp in one side of the cell circuit.



The advantage of this over the usual dry-battery system is apparent, and, while the voltage at the bell or button is not heavy enough to be dangerous, the bell should be wired with fully insulated wire, such as used in the wiring of the lighting system, instead of the usual thinly insulated bell wire.—W. A. Duncan, Toronto, Ontario.

A High-Tone Radio Buzzer

A buzzer with a clear, high-pitched tone is very desirable for radio-testing purposes, but, while it can be bought,



Operated by a Flat-Type Flashlight Battery, This Miniature Buzzer Produces the High-Pitched Tone So Desirable for Radio-Testing Purposes

such instruments are usually large, and cannot be used with a flashlight battery without exhausting it quickly. The home-made buzzer illustrated, however, is very small, and is particularly designed for flashlight-battery service.

The magnets are wound around cores made from 6-32 iron machine screws, $\frac{3}{4}$ in. long, the hexagon heads of which are filed round. The spool ends are made from fiber disks, $\frac{7}{16}$ in. in diameter, and holes are drilled through them to make a tight fit on the screws. A space, $\frac{1}{2}$ in. long, is left between the disks for the winding, which is of No. 32 insulated wire; No. 30 wire, which is a trifle larger, can also be used, if necessary. Wind the space between the disks full, and, when finished, bring the ends out through small holes drilled in the disks, as shown. Then solder together the ends of the wires that begin the winding. One of the outside wires is grounded to the metal frame, and the other is connected to a binding post.

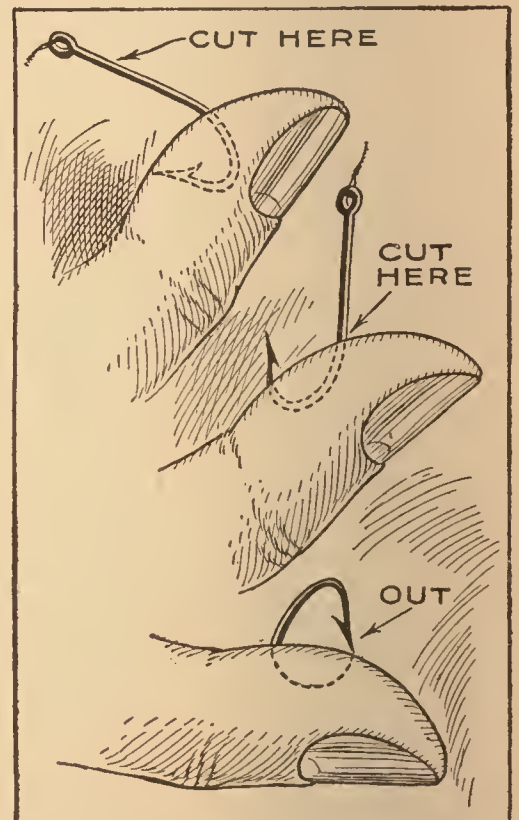
A piece of fairly stiff spring steel is used for the vibrator, which is mounted on the frame with a screw and two small washers. The tension screw merely presses against the vibrator. Contact points from spark coils, either new ones or old, which can be obtained for the asking at almost any garage, are soldered to the vibrator and the contact screw.

A piece of thick sheet brass or iron is cut to the pattern shown; then the necessary holes are drilled and tapped as indicated, a $\frac{5}{32}$ -in. tap being used for the threads. The screw holes at the center of the frame can be made to any convenient size; these holes are for the screws that fasten the instrument to its base. The bracket for holding the contact screw is made from a separate piece and mounted independently. After the hole for the contact screw has been drilled and tapped, a slot is cut through the bracket, and the ends squeezed together a little, to make a tight fit on the screw and prevent it from working loose. After all holes have been drilled and tapped, the frame is bent up as indicated by the dotted lines. Two binding posts are used for connecting the wires to the coils and contact-screw bracket.—Harry L. Gray, Independence, Ia.

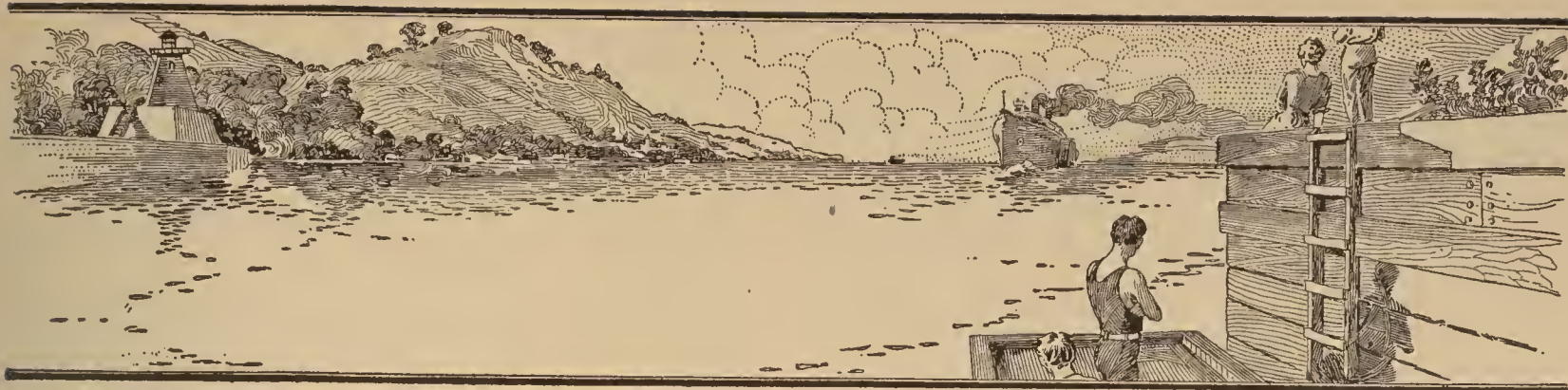
Extracting Fishhook from Flesh

There is little that frightens a person so much as running a fishhook into the finger or flesh.

The first impulse is to withdraw the hook by working it out at the point it entered; the barb, however, sticks in the flesh, and causes more or less suffering before it is finally removed, if removed at all without the aid of a physician. A simple method of taking out a hook



is illustrated in the drawing. In the upper example the shank of the hook is cut at the point indicated and instead of working the hook out the way it entered it is pushed out as shown in the bottom drawing. When the barbed end of the hook is pushed out of the flesh, cut the shank again at the point shown in the middle drawing, take hold of the barb with the pliers, and turn it out; then cleanse the wound and apply antiseptics. For this as well as other purposes, the fisherman will find a small pair of wire-cutting pliers a useful article.



Combination Tent and Pack Cover

By C. S. TAYLOR

SPORTSMEN and vacationists "roughing it," and carrying their own bed and board on their backs, or in a canoe, will appreciate the obvious advantages afforded by a tent that also serves as a cover for the owner's camp effects when not used as a shelter.

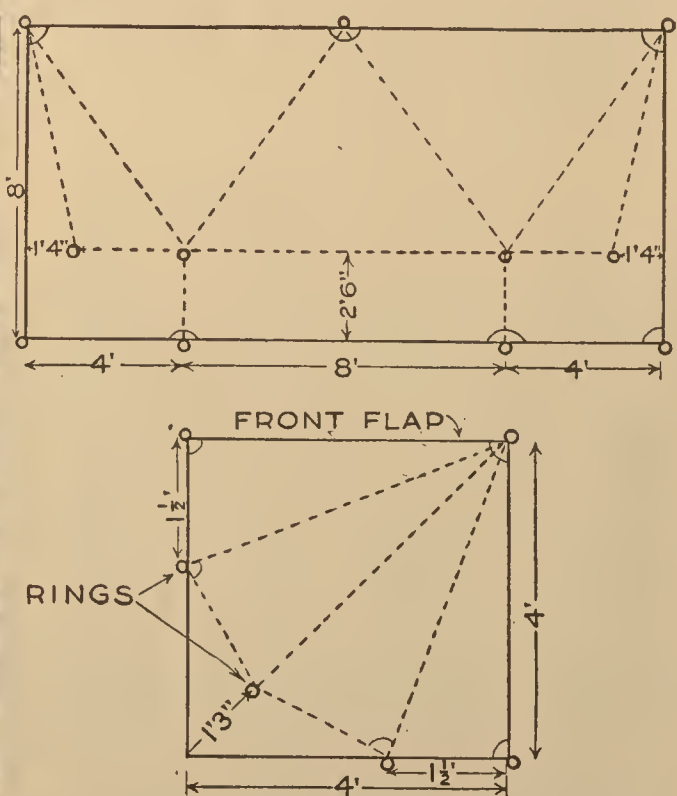
There are two methods of making the tent illustrated: One is to use a rectangular tarpaulin, or other suitable material, which is twice as long as the width. Make a strong hem around all edges and sew brass or iron rings, as indicated, at the ends of the dotted lines. The fly, or front flap, is made separately, from a square piece of material, the dotted lines showing the folds of the shelter when it is set up. It is unnecessary to do any cutting of material in making a tent of this type.

The alternative method requires more or less cutting of the material, which is cut along the dotted lines as a pattern. The separate pieces are sewed together, with the seam inside. This makes a regulation tent, and by making a few paper models of different sizes, it is an easy matter to get the right proportions

for a tent of different dimensions from that illustrated. The tent in the drawing is a good average size, and for making it, a piece of material 8 ft. wide and 16 ft. long is needed. It is not necessary to have the cloth in a single piece, but this is an advantage. In using yard-wide goods the strips are sewed together with heavy waxed thread, the seams running lengthwise of the 16-ft. piece. To reinforce the tent at the corners, where the greatest strain comes when the tent is pegged and the guys in place, it is a good plan to sew patches of cloth on both sides, where the rings are sewed on. The tent is amply large for two occupants, and when set up is 8 ft. wide, 6 ft. deep, 7½ ft. high at the front, sloping to a height of 2½ ft. at the back wall.

For a light summer tent a heavy grade of unbleached cotton cloth is a good choice, although if heavier material is wanted, regulation canvas duck of several weights can be used.

If a light nonwaterproof material is used, it can be processed and made to shed water by the following treatment: In 4 gal. of boiling soft water dissolve



For the Sportsman or Vacationist "Roughing It" in the Woods or Traveling "Light" in a Canoe, the Tent Shown in the Drawing Not Only Provides a Shelter at Night, but Serves as a Cover for His Personal Effects

$\frac{1}{2}$ lb. of powdered alum; also dissolve $\frac{1}{2}$ lb. sugar of lead in another 4 gal. of water in a separate vessel, and when both chemicals are completely dissolved, pour the alum solution into a tub, and then add the lead mixture; let this stand for several hours, and pour off the clear liquid. This is used to saturate the tent material thoroughly. To make the cloth entirely waterproof, it is necessary to fix the acetate of aluminum in the fibers of

the cloth, and this cannot be done unless soft water is used. Finish the process by light rinsing in clean soft water, and hang up to dry. The sugar of lead used is a virulent poison, and should not be taken internally. Also, as some persons show a peculiar tendency to absorb poisonous lead salts through the skin, with accompanying bad effects, it is suggested that a stirring stick be used instead of the hands for saturating the cloth.

Novel Rubbish Box for Park

Receptacles for waste in public parks would not be such an eyesore as they usually are if made to represent animals,



like the one in the illustration. The outline of the animal is first drawn on a piece of wall-board, which is then used to mark the design on the sides of the receptacle. The sides are made of 1-in. boards, glued edge to edge,

and strengthened by flat-iron crosspieces. A good size for a receptacle of the type illustrated is 4 ft. high by 10 in. wide. The opening for rubbish is at the top, in the piece connecting the sides, and an opening, covered by a sliding board, should be cut in the bottom also, for convenience in emptying. Careful painting will add considerably to the effect of these novel boxes.

File for the Brief Case

An index file filler, of a size to fit the brief case, can be obtained from many stationers. This, when fitted into the case does not add appreciably to the weight, and letters, papers, and other documents are readily found under their proper index letter, and in perfect order, so that no time is wasted in hunting for what is wanted.

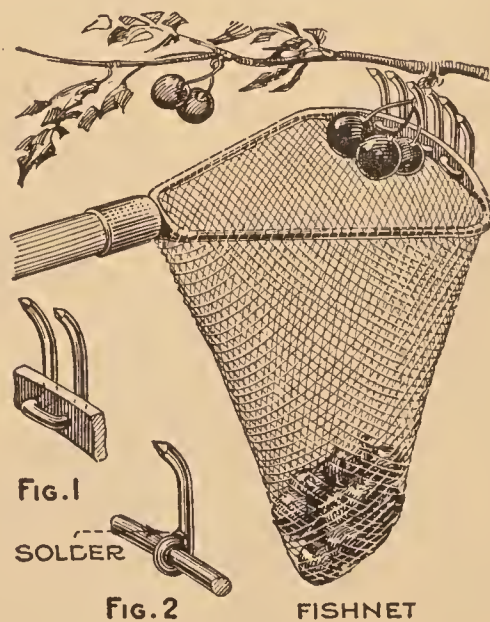
☐ A mark at the top of the automobile steering wheel to show when the wheels are straight ahead will be found of much assistance in maneuvering the car.

Replacing Cylinder-Head Bolts

The last two bolts on the light-automobile cylinder head are located directly underneath the dash, and must be in place while the head is inserted on the engine block. To push the head into place, with these bolts protruding, results in the gasket being bent, torn, or disarranged. The usual practice is to have a helper who holds the bolts while the cylinder head is being put on or taken off. A simple solution to this problem consists in stretching a rubber band, made by cutting a piece from an old tube, around the two bolts, underneath the heads.—A. W. Michener, New York City.

An Effective Cherry Picker

For picking cherries rapidly with a minimum of climbing, an effective implement can easily be made. A frame is



made of stiff wire or light iron rod, the ends being brought together and forced tightly into a handle of the proper length. On the front of the frame a series of picking fingers, or hooks, are fastened, about $\frac{1}{4}$ in.

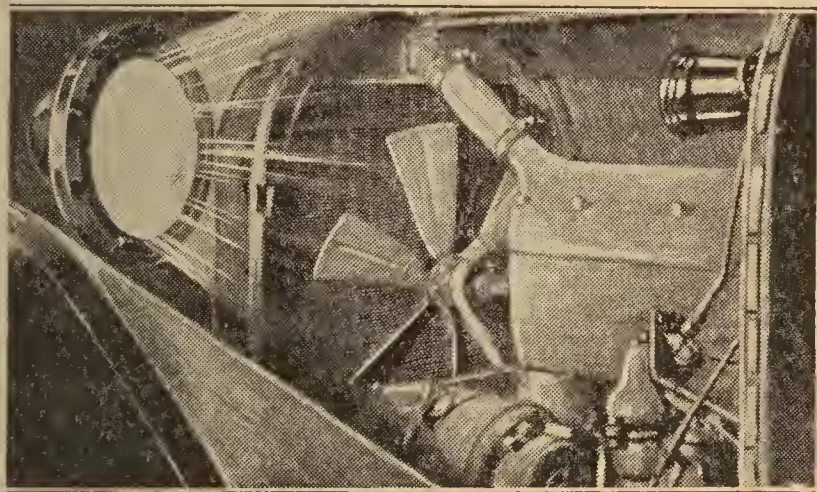
apart, so that the fruit cannot pass between them. Figures 1 and 2 illustrate two methods of attaching the hooks. Solder should be used in both cases, to make the fingers rigid. The device is completed by attaching a bag of close-woven fish netting to catch the fruit as it is plucked from the tree.—Wm. Melas, Philadelphia, Pa.

Auto Rim Incloses Flower Bed

To form an inclosure for a circular flower bed, a discarded automobile tire rim can be used. The rim is merely placed in the location desired, the central space filled with earth, and the seeds or plants put in. A larger flower bed of this character can be made by using the broad tires from wagons. By allowing about $\frac{1}{2}$ in. of space at the top, the rim will hold water until the soil inside absorbs it completely.

Trouble Light on the Auto

The headlamps of several makes of automobiles may be turned about on their brackets to illuminate the entire space underneath the engine hood, and make repairs or adjustments to the engine at night almost as easy as in daylight. If the light is so built that it is not braced to the body of the car, it is very simple to turn it around. This is done by loosening the lamp-bracket nut, and turning the whole assembly around, or by removing the two nuts that hold the lamp to the bracket, lifting it off,



By Reversing the Position of One of the Headlamps of an Automobile, So That the Light Shines Backward, the Space under the Hood is Lighted

turning it around, and replacing it on the bracket. Of course, the method of mounting the headlamps will differ on various cars.

Homemade Garden Cultivator

A member of an Ohio garden club built the hand cultivator illustrated, at a total cost of a little over a dollar, obtaining with it results fully equal to those obtainable from the manufactured and higher-priced hand cultivators. Practically the only expense was the cost of having the cultivator shovels forged by a local blacksmith. The adjustable wooden frame that holds the cultivator shovels is arranged

so that the implement can be set for shallow, medium, or deep cultivation. The handles are $5\frac{1}{2}$ ft. long and 22 in. apart

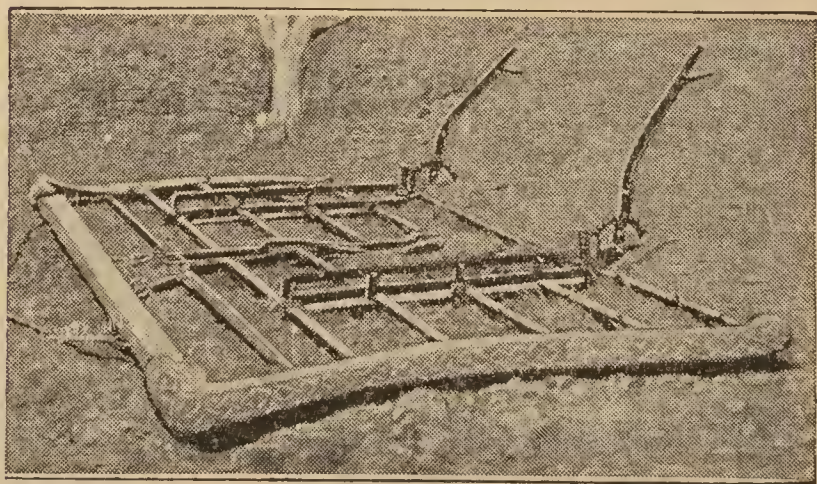


For Use on an Allotment in a Garden Club, One of the Members Built This Efficient Cultivator

at the outer end. The wheel, which may be one taken from an old baby carriage, or, better, from an old wheelbarrow, should be lined up exactly midway between the handles.

Harrow Prevented from Injuring the Bark of Orchard Trees

Under some conditions of fruit culture, particularly in regions where rainfall is scant during the growing season, constant harrowing is necessary to maintain the moisture-preserving mulch. In order to make a good job, it is desirable to work as close as possible to the trunk of the tree, but in doing so, the bark is fre-

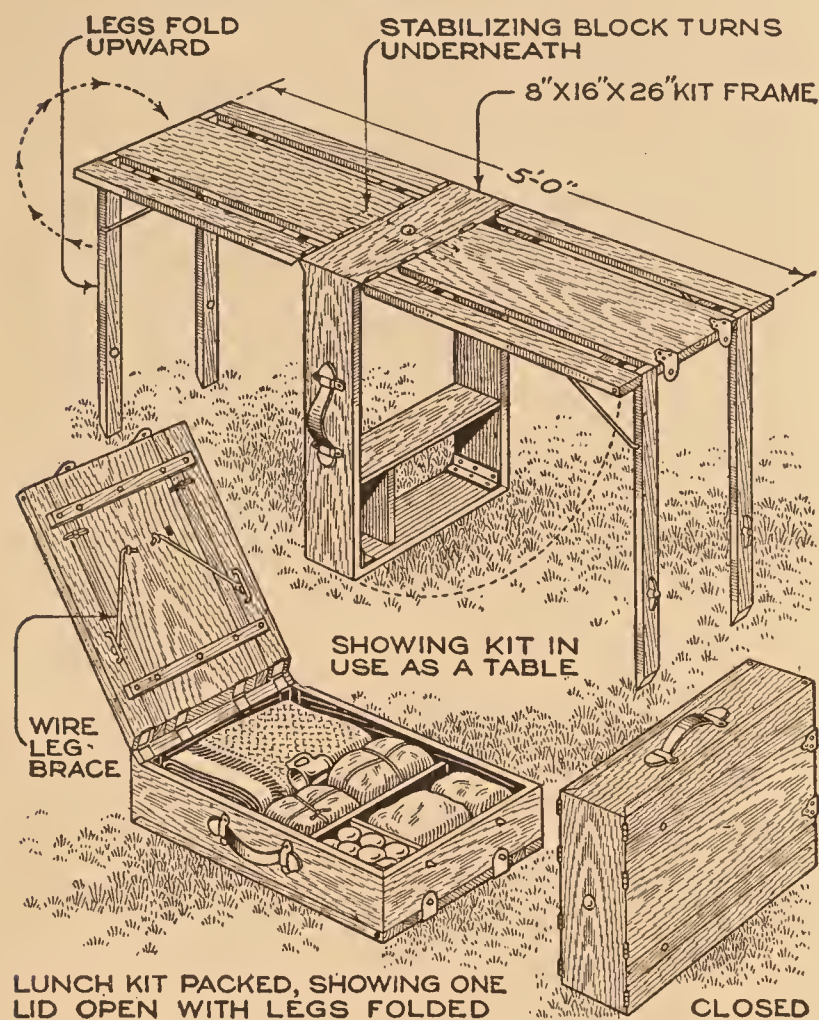


Old Automobile Tire Secured to the Sides of the Iron Harrow Frame, to Prevent It from Injuring the Bark of Fruit Trees

quently injured by contact with the harrow. The illustration shows the means used in one orchard to prevent this. Old automobile tires are cut and lapped over the sides and corners of the iron harrow frame, to which they are secured with wire.—W. L. Salvage, Beaumont, Calif.

Motorists' Folding Lunch Box and Table

For the automobile outing, when lunch is taken along, a compact and substantial combination lunch box and table can be



A Cleverly Designed Combination Table and Lunch Box for Automobile Excursions

made along the lines of the one illustrated. In use, the top and bottom hinged covers open horizontally, and a pivoted block, attached inside one end of the box frame, helps to stabilize the outfit. The legs are pivoted on a small iron rod and open downward; they are held rigidly vertical by means of wire braces, attached to the underside of the cover, the ends of the wires fitting into a hole on the outside edge of each leg. The legs are provided with buttons on the underside so that, when folded up in their slots, the buttons can be turned, locking the legs and forming a continuous cover.—Frank E. Leitch, Brooklyn, N. Y.

☞ To remove plaster and lime stains from floors and woodwork, wash with a solution made by adding 1 pt. strong vinegar to 1 gal. hot water.

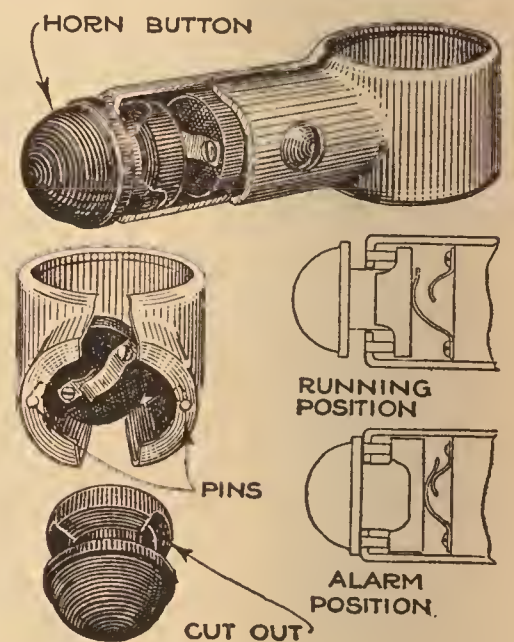
Making Enamel Flow Easily

Our handy man taught me to keep the can of enamel in a pan of warm water when using, so that it would flow easily. Also, when enameling such articles as a bedstead, to do all of one rod or spindle at once, so that the finish will harden evenly. Fewer coats of the warmed enamel are required than by the usual method of thinning it to the desired consistency with turpentine. By keeping the enamel warm and doing the work in a warm room, the finish will flow more easily and smoothly, and the danger of getting a lumpy finish will be greatly reduced. In all cases where enamel is applied, it will be found better to apply two or more thin coats than a single heavy one.—Mrs. James Doremus, Passaic, N. J.

An Automobile Burglar Alarm

An alarm that sounds when the automobile is started is easily made for the light car, provided the original magneto-operated horn is used. The end of the case on the steering column, which carries the horn button,

is drilled on opposite sides to take two short pins, and the inner flange on the button is cut out to about one-half of its original thickness at two places, as shown. When the button is in the running position, the pins fit into the cut-out sections of the flange. In this position there is no electrical contact. When leaving his car, the driver presses the button and gives it a quarter-turn. This causes the pins to bear on the higher or thicker part of the flange, keeping it pressed in, and establishing an electrical contact. When the engine is idle and the button is depressed, as shown in the alarm position, the horn is not affected, since it receives no current from the magneto. As soon as the engine is started, the flow of current from the magneto to the horn will cause the latter to blow, notifying the driver that some one is tampering with his car.—R. H. Kasper, Philadelphia, Pa.

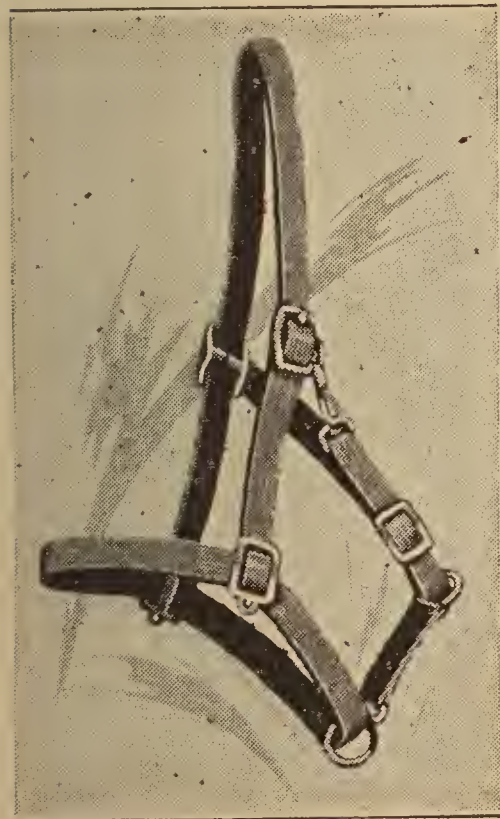


Applewood for Smoking Meats

As a rule hickory is preferred for smoking meats, but as this wood is rapidly growing scarce, and does not occur plentifully in all regions, maple, birch, and other hardwoods are widely and satisfactorily used. It is not generally realized that applewood produces excellent results. Either the trunks or boughs of the trees are used. Thus, when old trees in an apple orchard are cut out, they should be sawed up and laid aside for use in the smoke house. Applewood produces a smoke that has a tendency to sweeten the product treated, and gives an excellent flavor.

Harness from Auto Tires

Since no stitching is required, and the material used is part of a discarded auto-



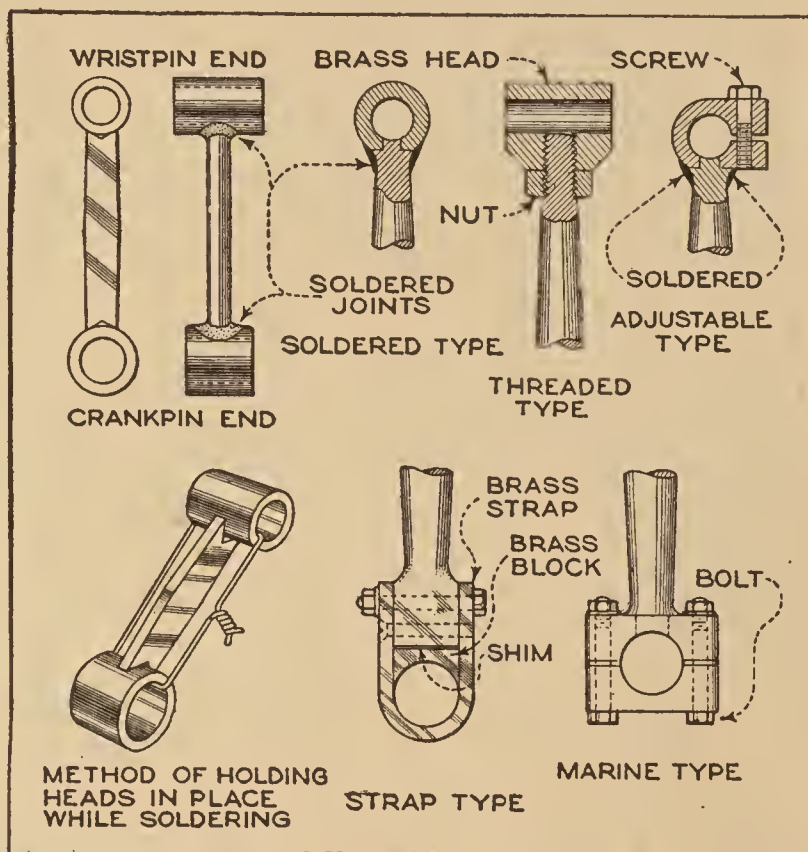
mobile tire, the halter illustrated can be easily made. Only the fabric part of the tire is used, the rubber tread being peeled off. The material thus obtained is then cut into strips of the proper length and width. The metal parts can be obtained from any hardware store; the buckles and

rings are riveted on. If bit straps are used in the metal loops on the cheeks of the halter, it can be used for driving or plowing. The appearance of the finished halter can be improved by a coat of black paint.—John Fowler, Regina, Can.

Connecting Rods for Model Machinery

Model builders and experimenters are often at a loss as to the best and easiest method of making the connecting rods and pitmen for models and machinery. To have them forged or cast is generally out of the question on account of the expense and time. The built-up connecting rod clears the way for quick work, and is not only strong and serviceable but it

also presents a good appearance. One of the simplest types of connecting rod is made by soldering or sweating tubing ends onto a notched shank. The design is laid out on paper and the exact dimensions found for the notched shank, or arm. Square or round stock, either solid or tubular, may be used. The notches in the end are of 90° and are made with a square file. To make sure of the squareness of the notches, lay the tubing pieces in them and square them up with the eye. To solder the three parts, fasten them together with wire as in the drawing, and



Methods of Making Small Connecting Rods for Model Machinery, from the Simplest Possible Type to the Exact Reproduction of the Original

then apply the solder, allowing it to fill up the notch and build up a fillet in the angle between the shank and the tubing.

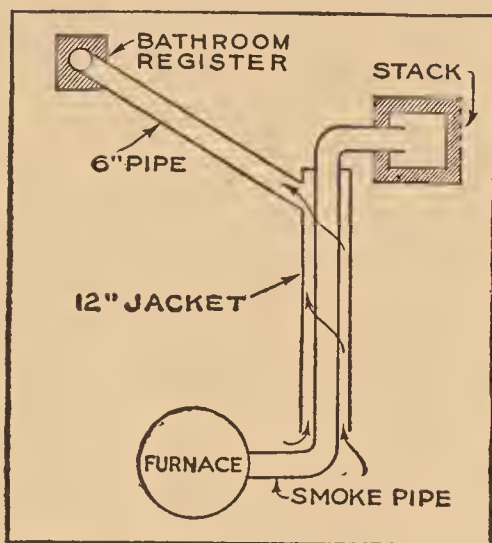
When using taper-turned pitman rods, turn a small nub, or teat, on the rod ends and drill the bushings accordingly.

A rod that is adjustable for length can be made by using a threaded arm and solid brass heads; a locknut is used to hold the setting and keep the parts tight. A connecting rod with semisplit bearing ends, which are adjustable for wear, is made by sweating the brass ends to the rod arm, splitting the heads and placing a screw as illustrated. The strap form of connecting rod is much used for engine work and is strong and of good appearance. It is also adjustable, shims being laid between the solid-rod end and the half-bushing. The rod proper may be made of brass or steel, and the strap and bushing of brass. The strap is held to the rod end by two flat-head screws, the bushing and strap forming the whole cir-

cumference of the bearing. Where a solid and strong type of bearing is wanted, without regard for cost, a connecting rod is turned from rectangular stock and fitted with a lower cap, as shown for the marine-type bearing. This rod is adjustable for wear, shims being placed between the bearing halves, which are held together by bolts. When possible, it is advisable to insert two pieces of rod in the eyes of the bearing and square them up previous to soldering, in order to insure an accurate alinement of the bearings. If this is not possible, then check after soldering and bend until the eyes are square.

Auxiliary Radiator for Pipeless Furnaces

In houses that are heated by so-called pipeless furnaces, there is usually a spot,

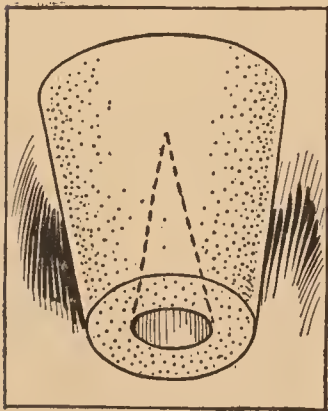


such as a bathroom, that fails to get its share of heat, and the diagram illustrates how an additional amount of heat can be conducted, under most circumstances, to that room. A 12-in. jacket,

around the furnace smoke pipe, has a 6-in. pipe joined to it near the upper closed end. The smaller pipe serves to carry the hot air to a register in the floor of the room it is desired to heat.—Jos. N. Parker, Richmond, Va.

Repair for Vacuum-Bottle Corks

The action of hot coffee and other liquids contained in a vacuum bottle will cause the cork to lose much of its spring, and allow the contents to leak after continued use. The old cork may be made as good as new by making a hole in the center of the small end with a six-penny nail, or pointed lead pencil; this will expand the cork and make it fit tightly inside the neck of the



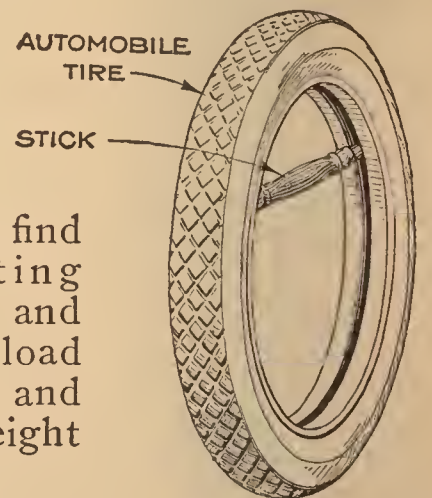
bottle. A small wooden plug, driven into the hole, will make the repair permanent.—William Mallet, Olympia, Wash.

Watering Young Trees

Thousands of young fruit and shade trees are set out only to die every year, not through neglect, but killed by kindness. In one instance, a number of apple trees were planted at the same time, and under identical conditions, and perhaps half the number were within spraying distance of a hydrant. Naturally, these trees received plenty of water at all times. The remainder were so located that it was necessary to carry water to them, and this was obtained from a rain barrel. During a prolonged dry spell, I was greatly amazed to find that the trees nearest the hydrant did not thrive, regardless of the amount of water supplied, while those watered from the rain barrel showed no signs of withering. In due course the first trees died out, and the elderly gardener who came to aid in replacing them explained that they had been killed by the frequent applications of cold water. The water in the rain barrel was usually warm, and for that reason, the trees upon which it had been used thrived as from natural showers. It is not necessary that the temperature of the water be more than 65 or 70°; this may be obtained quite naturally during the summer by allowing a barrel of water to stand in a sunny place. If the barrel is refilled in the evening, the water will as a rule be ready for use the following afternoon.—G. E. Hendrickson, Argyle, Wisconsin.

Carrying an Automobile Tire

An automobile tire is not the easiest thing to carry for any great distance. Although the initial part of the trip may be made without undue strain on the hand or arm, the latter stages usually find the carrier casting about for ways and means to carry his load more comfortably and distribute the weight more evenly.



The drawing shows a method of carrying such a load conveniently and with a minimum of discomfort and fatigue. The idea is simple and consists in the mere insertion of a stick of suitable length and thickness inside the tire so that the ends will bear against the tire walls.—H. C. Rose, Newport, R. I.

An Improved Vertical Enlarger

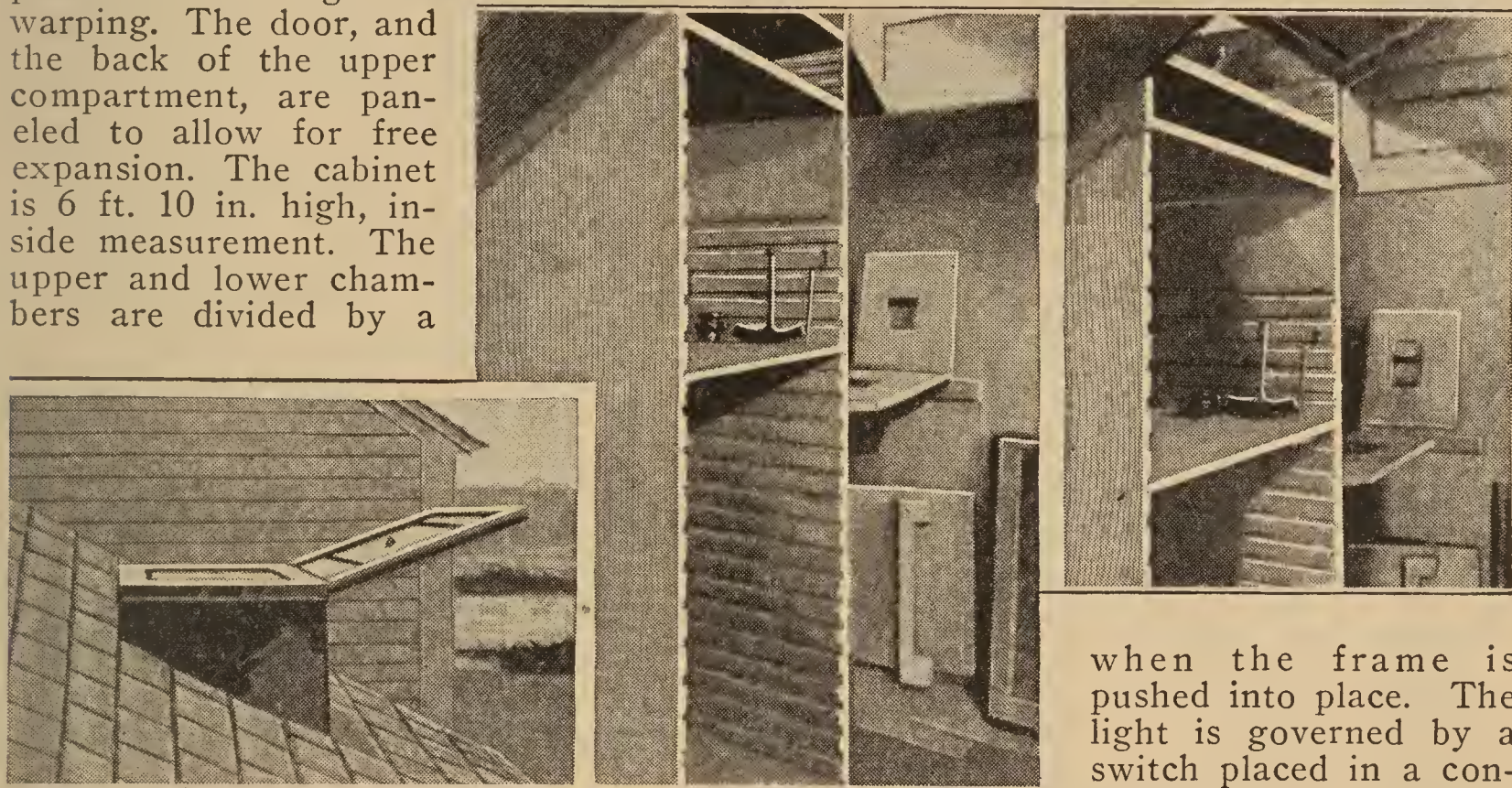
By F. E. HINKLEY

BY using the essential features presented in a vertical enlarger that I had once seen, and supplementing them with others for convenience in working, I made an instrument almost ideal in its adaptability for varying kinds of work.

The enlarging cabinet is made of 1-in. well-seasoned pine, grooved, and with particular attention given to have the grain of the sidepieces exactly similar, so that the contraction and expansion will be all in the same direction. This will prevent cracking and warping. The door, and the back of the upper compartment, are paneled to allow for free expansion. The cabinet is 6 ft. 10 in. high, inside measurement. The upper and lower chambers are divided by a

straight-filament lamps, and a crown of seven sockets for concentrated-filament lamps at the top. This arrangement gives good distribution with whatever lamps used. I prefer, however, the concentrated-filament lamps.

In the wall directly back of the light frame are two flat brass springs, corresponding to two similar springs located in the frame. These sets of springs are for the purpose of automatically connecting the lamp circuit to the exterior wires,



Left: The Light Hood on the Roof of the Laboratory. Center: A View of the Cabinet, Showing the Frame Grooves. Right: Interior View of the Roof Opening; Part of the Focusing Mechanism may be Seen on the Printing Frame

permanent shelf, 24 in. from the top of the enlarger.

The apparatus is erected in a low-roofed building, used as a laboratory, with the upper chamber joined to a short extension, leading out through the roof, as shown in one of the photos. I arranged for cutting off the light from the sky whenever desired, and, by means of a removable frame, holding electric lamps and placed in grooves at the top of the cabinet, am able to convert the enlarger into an instrument that can be used at night, and for purposes to which the daylight enlarger is not adapted.

This light frame, E, Fig. 2, occupies the grooves at the extreme top of the cabinet. It is made for the use of lamps in either a horizontal or vertical position, according to the kind available. There is a row of three sockets on either side of the frame, with one at the front and one at the back for regular 100-cp.

on both sides, has also one fixed position in the center of the upper chamber, and is supported in grooves. By having the glass ground finely on both sides, I obtain good diffusion, and this also aids in cutting out undesirable reflections. The distance between the ground glass and negative frame is always sufficient to prevent the granulated appearance in the projected image that is observed when the ground glass is too near the objective focus. Between the frames E and D are some light-trapped holes to provide ventilation.

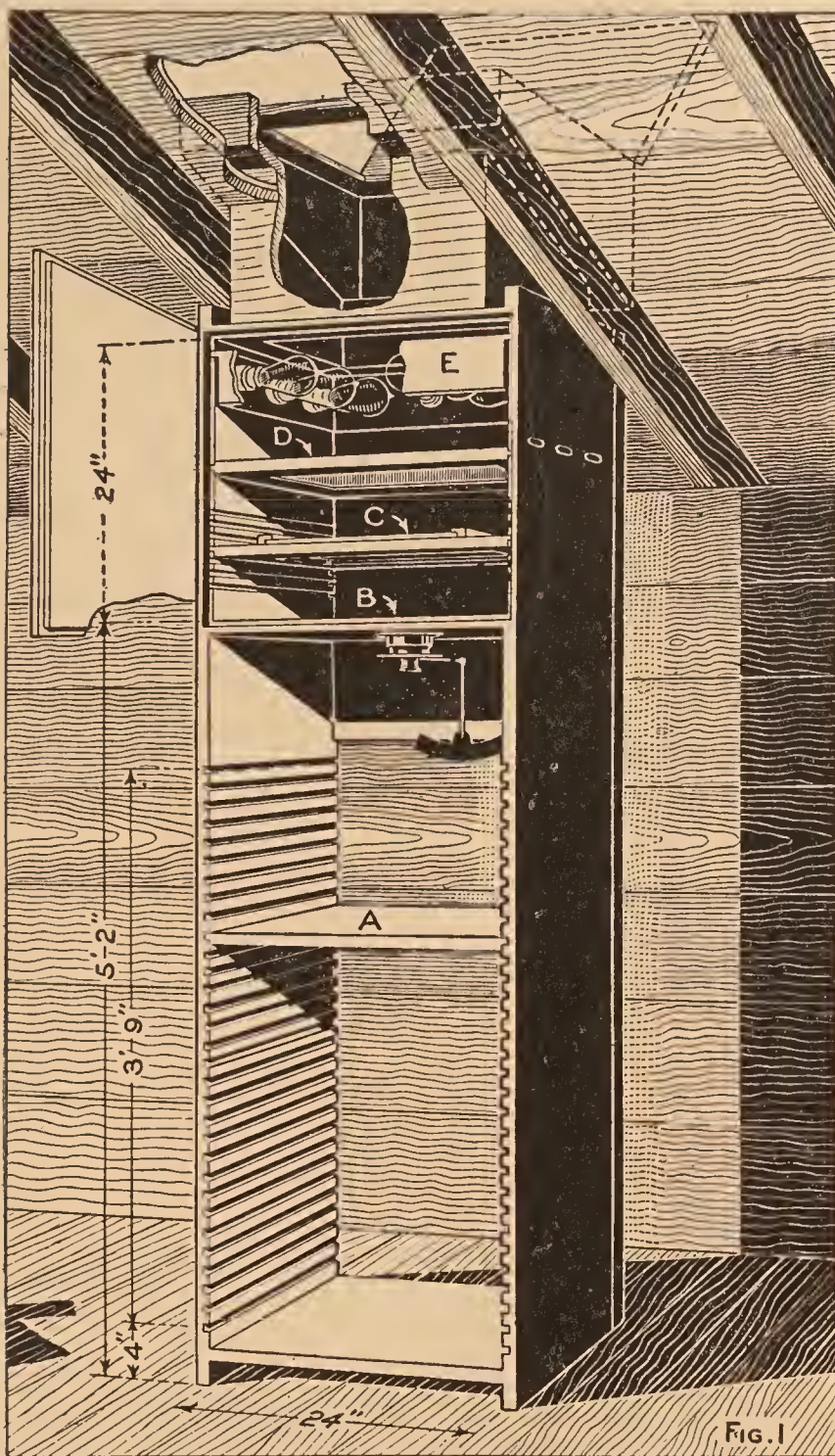
Three inches below the ground-glass frame, there are seven grooves, 1 in. apart, the last one being 3 in. above the permanent partition dividing the upper and lower chambers. These grooves accommodate the negative-adjusting frame C, Fig. 3. This frame is an assembly of three frames. The base frame has tongues on both sides to slide in the main grooves,

when the frame is pushed into place. The light is governed by a switch placed in a convenient position.

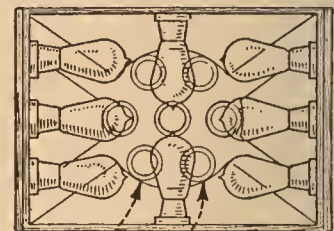
The next lower frame, D, Fig. 1, holding a 14 by 17-in. glass, ground

below the ground glass; it has also fixed guides at front and back, for holding in place the second thin frame, which moves from right to left. The latter has also fixed guides, at right angles to the first ones, for holding in place a third frame, which moves from front to back. The third frame has a rectangular opening for plates, or auxiliary frames, up to 8 by 10 in., and is self-centering by means of special spring clicks arranged to

shelf A, are cut at intervals of $1\frac{1}{2}$ in., beginning with No. 1, 13 in. from the top of the lower chamber, and extending to No. 31, at the bottom of the cabinet. The printing shelf, Fig. 4, is a plain, flat, parallel board, 1 in. thick, provided on one side with an adjustable frame working as follows: A brass bar, shown at the top, revolves on its axis by means of pins through lugs, or ears, at both ends. The two vertical arms, sliding on this



LIGHT FRAME
E
FIG. 2



SOCKETS IN
CROWN

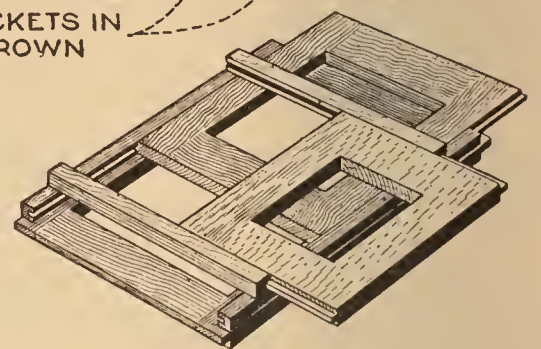


FIG. 3 ADJUSTING FRAME C

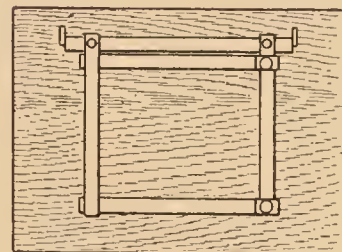
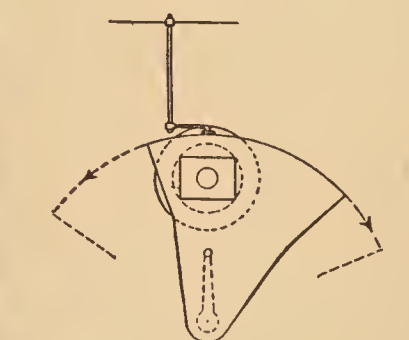
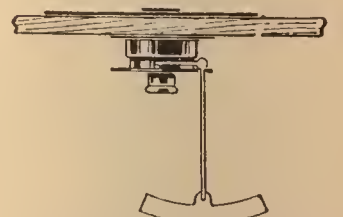


FIG. 4



LENS SHUTTER WITH
YELLOW-GLASS ATTACHMENT
FIG. 5

TABLE OF SETTINGS LENS $5\frac{1}{4} f$			
MAGN. OR REDTN	NEG. SHELF	FOCUS'G SCALE	SHELF NUMBER
1 TO 1	g	.5	1
" 2	a	.5	5
" 3	c	.4	9
" 4	c	.8	12
" 5	b	.1	16
" 6	b	.2	20
" 7	b	.3	23
" 8	b	.4	27
" 9	b	.5	30



LENS WITH FOCUSING
TUBE AND ADJUSTING
SCALE
FIG. 6

A Homemade Vertical Enlarger of Wide Range: The Construction of This Instrument Is Well within the Ability of the Earnest Amateur, and It Affords a Means of Making Very Accurate Enlargements and Reductions. By Means of Adjustable Printing Frames, Any Part of a Negative may be Brought into a Central Position for Enlargement

engage in notches. This whole arrangement is very convenient for bringing any selected portion of a negative into a central position for enlarging. The grooves in which the base frame slides are marked "a" to "g," from the lower one upward, for use in connection with the table of lens settings.

The grooves in the lower compartment, for the accommodation of the printing

bar laterally, and the two horizontal arms, sliding on the first pair, give an adjustment in all directions. These arms are locked in place by thumbscrews, and their own weight is the working pressure on the paper. The frame is adapted for 10 by 12-in. paper, and smaller; for other sizes, the shelf is reversed, and the paper held in position by thumbtacks.

In the center of the partition B, which

divides the upper and lower chambers, is set the objective, mounted in the smaller of two focusing tubes, which screw one inside of the other, with the screw threads common to focusing mounts and arranged to be held where wanted by a clamping screw. These tubes are approximately 3 in. in inside diameter, and give a lens movement of 1 in. The starting point being made at the center adjustment, there is an available focusing movement of $\frac{1}{2}$ in. in either direction. This movement, in connection with the movable negative shelf, in grooves "a" to "g," forms the means of focusing, and, with the focusing scale and table of settings about to be described, gives a simple and accurate means of obtaining any range of enlargement or reduction with certainty.

The front, or what becomes the lower end of the inner focusing tube holding the objective, carries a projecting flange on which revolves a small wheel, or roller, in connection with a pointer extending in front of the focusing scale, shown below partition B, at the back of the cabinet, and in Fig. 6. The construction is as follows: On a horizontal shaft extending from the lens to the back of the cabinet, are attached two arms at right angles to each other, forming a bell crank; the smaller arm carries the wheel, or roller, and the other, or pointer, ends just in front of the index scale below, at the back of the cabinet. The proportional length of the lever arms is very nearly 1 to 5, to facilitate reading, a movement of .01 in. in the objective being clearly indicated on the scale. A spiral spring, not shown in the drawing,

holds the wheel always against the lens flange when moved in either direction.

On top of partition B, above the lens, is located a shutter, Fig. 5, in a segment of thin tinplate, holding a frame containing a square piece of yellow glass. This is attached at the center of rotation to a pivot passing upward through the board, and at the lower end of this pivot is placed a hand lever, indicated by dotted lines in Fig. 5, which extends toward the outer edge to facilitate working. Three studs or stops are arranged on partition B, to limit mechanically the movements of opening and closing of the shutter, when focusing or exposing the lens.

The lens employed is one of $5\frac{1}{4}$ -in. focus, and the table of settings is arranged as follows: The first column gives in full numbers the magnification or reduction; the second gives the grooves for the negative shelf; the third gives the number representing the lens focus, obtained by turning the thumb flange of the focusing tube either to the right or left, until the proper number is reached on the scale below, and the fourth column gives the grooves numbered from one downward, in the lower chamber, for setting the paper shelf A in its proper position. By means of this table, the settings are made mechanically and with ease and certainty. When the necessary tests and adjustments of the figure on the scale have once been made, an error in focusing is impossible.

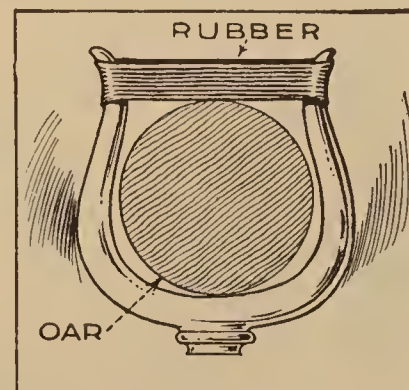
The arrangement of this enlarger permits almost endless variations in adjustments between "natural or same size," to enlargements or reductions from one to nine times.

Cleaning Soiled Leather

Soiled leather articles, such as puttees, shoes, traveling bags, and the like, can be cleaned by applying saddle soap with a moist sponge and rubbing with a clean, dry cloth. Oxalic acid, which is sometimes used alone and sometimes in preparations, for cleaning and bleaching leather, is injurious, and should not be used. Although it is almost impossible to remove oil or grease spots from leather, in some cases satisfactory results may be obtained by coating the spot with a thick and quick-drying rubber cement, then peeling off the coating when it is almost dry. It may be necessary to repeat this operation several times to clean the leather thoroughly.—A. C. Cole, Chicago, Ill.

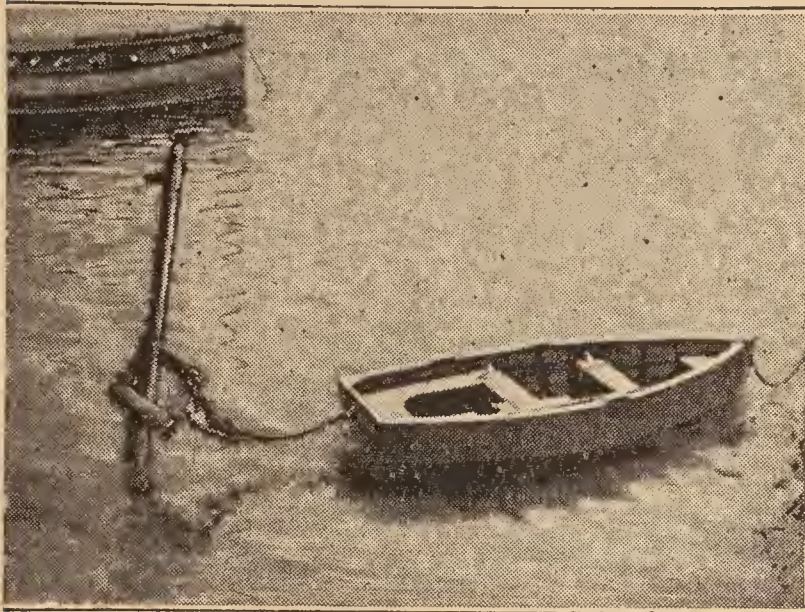
Keeping Oars in Rowlocks

When the beginner goes rowing he usually has the unpleasant experience of pulling the oars from the rowlocks just at the time when it is most inconvenient. To overcome this and make learning to row easier, a heavy rubber band, cut from an old inner tube, can be placed across the ends of the rowlocks. These prevent the oars from jumping out, although the rubber will stretch considerably without coming off the horns of the rowlocks.



Mooring Boats in Tidal Waters

The square object hanging from the mooring post in the illustration is a wooden float. The post is driven into the

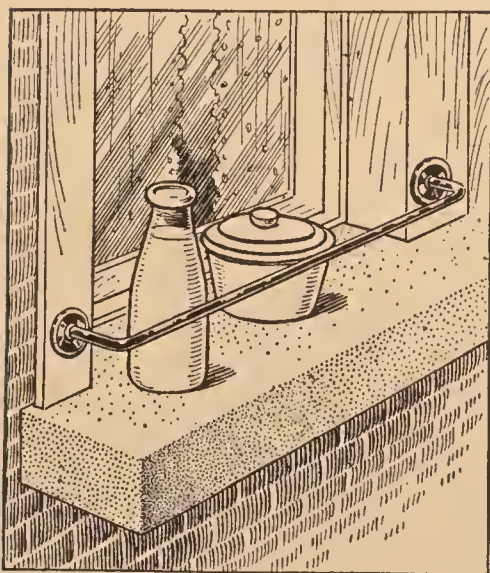


A Mooring for Small Boats in Tidal Waters: The Square Wooden Float Slides Up and Down on the Mooring Post as the Water Rises and Falls

bottom of a tide-water channel, and the float rises and falls with the tide, but is prevented from getting away by a cross-piece at the top of the stake. This arrangement provides a short-line mooring of constant length, serves better than the anchored buoy and rope for keeping small craft head-on to the wash of passing vessels, and is well adapted to places where wind and wave conditions are known to be quite regular.—L. R. Perry, Berkeley, Calif.

A Window-Ledge Guard

In many apartment houses it is the custom to set vegetables, milk, and other foods on the window ledge, particularly



when the weather is cool. It frequently happens that these articles are knocked or blown off. Even if the windows do not face a street where falling objects might hurt pedestrians, there is always the danger of breaking a skylight or other windows in their descent through a light well or court. To prevent this, a towel, or curtain, rod can be fastened in the window frame as shown in the drawing.

when the weather is cool. It frequently happens that these articles are knocked or blown off. Even if the windows do not face a street where falling objects might hurt pedestrians,

Killing Dandelions

While beautiful in itself, a dandelion is a nuisance in lawns where a close, green turf is desired. The removal of the dandelions by cutting off the roots is a laborious and expensive process where they are at all numerous, and may do more harm than good. The dandelion is a perennial, and perpetuates itself by means of a long deep-growing taproot. To cut this root off a few inches beneath the surface of the ground does but little damage to the pest, and within a few days new shoots will appear. The cutting is also very likely to split the crown, and two plants will appear where but one grew before. However, if a tablespoonful of salt, or a half cupful of gasoline is applied at the cutting point when each root is cut off, the eradication may be made complete. This method is impracticable where the dandelions are numerous.

If the dandelions are very thick, they can be controlled and practically eradicated by spraying them with a solution made by dissolving 2 lb. of iron sulphate or $2\frac{1}{2}$ lb. of common salt in a gallon of water. The iron sulphate, which is known under a variety of other names, the commonest being copperas and green vitriol, comes in either granular or crystal form, and dissolves easily. One gallon of solution will spray 860 square feet.

On small lawns, the solution may be applied with a sprinkling can having very small perforations, care being taken to see that all plants are thoroughly wetted by the liquid. On large lawns or golf links, a hand spray pump, which is fitted with a nozzle for throwing a fine, mistlike spray, may be used. The fineness of the spray is important, as the finer it is, the better it will settle over all portions of the plant. Hand sprayers can be bought at varying prices, but the sprayer itself is not so important as the nozzle with which it is fitted. Insist on getting a nozzle that will give the necessary fine spray.

The spraying should be done after the dew is off, in the forenoon of a day when the weather indications show fair weather to be probable for 48 hours. Rain inside of 24 hours will undo the results, and make it necessary to spray again. Wait until three days after the lawn has been mown, as the iron sulphate injures new-mown grass. Do not sprinkle or mow the lawn for three days after spraying, but give the sulphate a chance to work. It may be necessary to spray

three or four times during the season, or even oftener, if the dandelions are very thick and have been allowed to go to seed once or twice. Scattering plants, which the spraying treatment has failed to kill, may be destroyed by placing a tablespoonful of the granulated iron sulphate on the crown of each plant.

Fertilizing the lawns to thicken the grass, and reseeding of the thin spots, will help to prevent reinfestation. Finely rotted barnyard manure is preferable as fertilizer, but the application of 100 lb. of sodium nitrate to 1,500 sq. ft. of lawn will be helpful.

The salt solution referred to has at least two distinct advantages over the sulphate solution; it is cheaper, and will not stain walks, fences, or clothing with which it comes into contact.

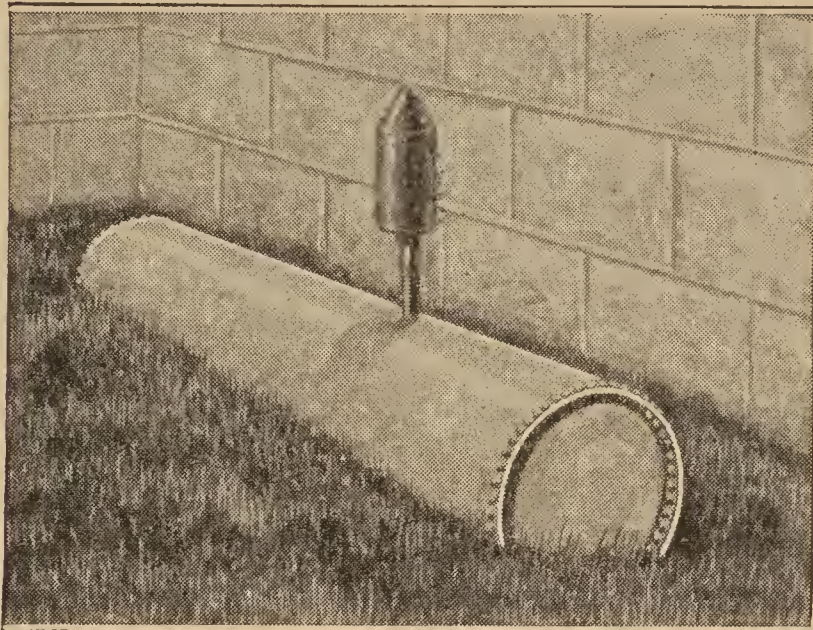
While this method of destroying dandelions has been found successful at the Wisconsin College of Agriculture, and has been shown, by seven years of investigation by the New York station, to be a dependable method, no permanent effects can be expected from spraying, so long as dandelions are allowed to go to seed unchecked on adjoining lawns, in fields, and along roadsides. It is undoubtedly true, that by community action in some form, either by agreement or ordinance, dandelions may be eradicated in an entire community, but it is useless for an individual to expect to keep the dandelions out of his lawn after the first treatment, unless he is willing to spray his lawn at least once in three years.—University of Wisconsin, Madison, Wis.

Testing the Vacuum System for Leaks

A small leak between the intake pipe of the carburetor and the filling chamber of the vacuum tank of an automobile is revealed by the difficulty experienced in maintaining the proper fuel level in the tank, especially on heavy pulls or when climbing hills. A small air leak is difficult to find because of the loud suction through the carburetor. To concentrate the suction at the point of leakage in the fuel-tank connections, a simple and positive means is to loosen the bolts connecting the carburetor to the engine and insert a piece of tin or sheet brass, large enough to cover the intake opening; then tighten the bolts to hold the tin in place over the intake. By turning the engine with the crank, the increased vacuum in the intake produces a positive sound at the point of leakage, so that the location is readily determined.

Muffler for Electric-Lighting Plant

The owner of an electric-lighting plant, located in the basement of his home, used the arrangement illustrated for muffling

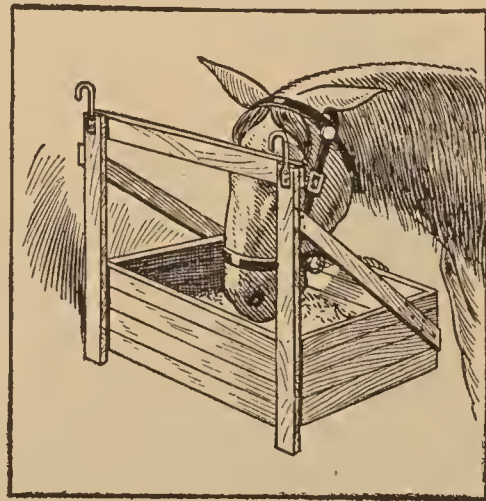


To Muffle the Exhaust from an Electric-Lighting Plant, the Owner Attached the Muffler of the Engine to a Discarded Water Tank

the exhaust from the small engine used to drive the dynamo. The exhaust pipe was led to the outside and screwed into one of the openings in a discarded water tank, the regular muffler that formed a part of the engine equipment being screwed on top of the tank, as indicated. To prevent possible explosion when starting, a two-way valve, or cut-out, is installed in the line; this is opened at first, allowing the gases to escape before they reach the tank. Then, after the engine is running smoothly, and no unexploded gas goes through it, the valve is turned, diverting the exhaust into the tank where it expands and passes, with little noise, to the air through the muffler.

Portable Feed Box

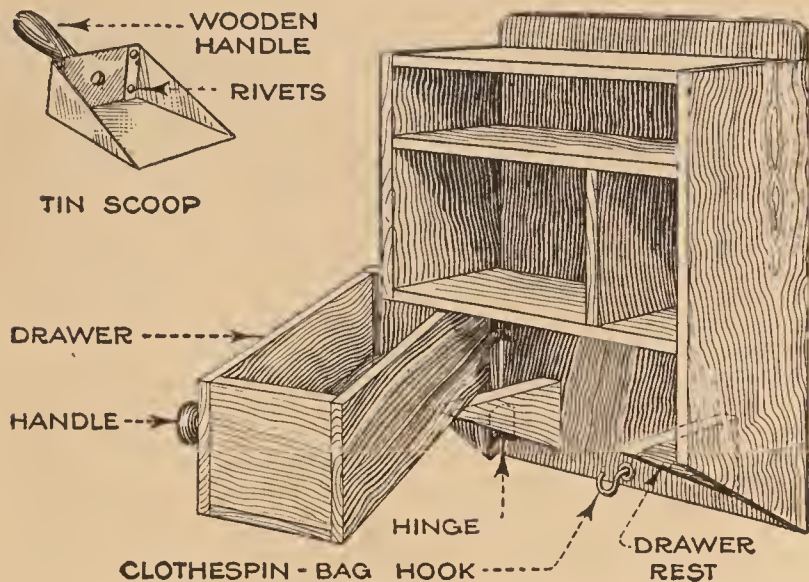
A teamster who is obliged to feed his horses at noon away from the barn uses the feed box illustrated, which can be slipped over the edge of the wagon box or a fence.



This box prevents the waste of grain attendant on the use of a nosebag, and does not occupy much more space.—Maggie A. Cromlich, Carlisle, Pa.

A Handy Laundry Cabinet

A cabinet in which all necessary washing materials, such as soap, bluing, soap powder, and the like, may be kept in one

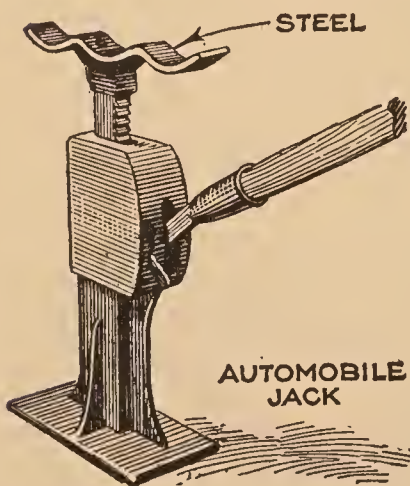


A Cabinet for the Laundry, in Which All Washing Materials are Kept Together

place will be appreciated by the laundress. The over-all dimensions of the cabinet illustrated are 5 by 12 by 20 in.; and the swinging compartment, or drawer, which is used for soap powder or chips, is 4 by 5 by 10 in. If desired, a door can be fitted to cover the upper compartments. A hook is screwed underneath the soap drawer, from which the clothespin bag is hung. A simple scoop for handling the washing powder is easily made from a piece of tin and is kept in the drawer.

Jack Head Saves Blocking Car

Sometimes it becomes necessary to make tire or other repairs on the road when the car is standing on a slight slope,



and, unless the brakes are in exceptionally good order, one is then obliged to find something to block one wheel while the other is jacked up.

To eliminate the need of scouring the roads and fields for a rock or piece of wood,

and to prevent the car from moving and dropping off the jack, the special head shown was formed from a piece of steel bar and attached to the jack. The use of this attachment makes it possible, when making repairs on a sloping surface, to throw the center of weight ahead or back by placing the front or back part of the head under the axle.

Adjusting Vacuum Tubes to Voltmeter

If indicating instruments are used to adjust the filaments of vacuum detector tubes used in amateur wireless-receiving sets, a voltmeter should be used instead of an ammeter. Tungsten filaments show a decrease in current throughout their life, and if a constant current is maintained, rather than a constant voltage, the life of the tubes will be shortened, and the signals will be no better. The normal filament-terminal voltage for most standard tubes is from 5 to 5.4 volts.

Improving Pack-Sack Straps

The common method of carrying the hiker's shelter and provisions is in a pack sack. When light loads are carried, no great strain is imposed by the sack, but when the weight is upward of 75 or 80 lb., the pressure on the shoulders becomes quite irritating. An improvement that will make its carriage easier and less fatiguing is shown in the drawing. This consists in using a short strap with a har-



ness snap on one end. The short cross strap is riveted to one of the pack straps, and the snap hooks over a ring fastened to the opposite shoulder strap. Instead of the shoulders taking the whole strain, it is

distributed over the entire upper part of the body. If desired, the cross strap may be left unfastened until the load begins to feel "heavy," when it can be snapped in place and the shoulders eased.—Robt. P. Lincoln, Minneapolis, Minn.

Blackening Brass

To blacken the brass work of cameras and similar fittings of the same metal, clean the pieces thoroughly, so as to free them entirely of grease, and dip into a solution composed of 200 gr. of copper nitrate to the ounce of water. After allowing them to remain for a few minutes in the bath, remove and heat until the desired color is obtained.

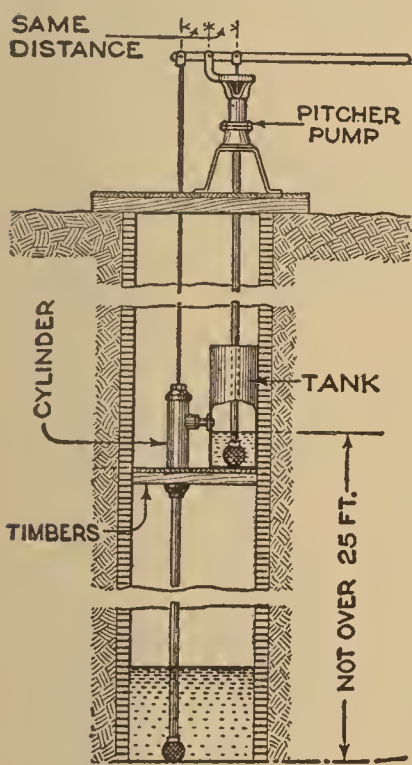
Preventing Jars from Cracking during Canning

Some of the least-known reasons why glass jars crack in canning, when the containers are placed in the boiling water, and their remedies, are:

Overpacking the jars; such products as corn, pumpkin, peas, lima beans, and sweet potatoes expand, so that if the jar is completely filled it will be almost sure to crack. Do not fill the jars quite full. Placing cold jars in hot water or vice versa; as soon as the jars are filled with hot sirup or water, place in the canner. If the top cracks during sterilization, the wire fastener used on some types of jars was too tight. In a steam canner, cracked jars are often the result of too much water; the water should not come above the platform on which the jars are placed. Cracking is also caused by allowing a cold draft of air to strike the hot jars.—Mrs. Mary F. Scott, Albany, N. Y.

Novel Pump Arrangement for Deep Wells

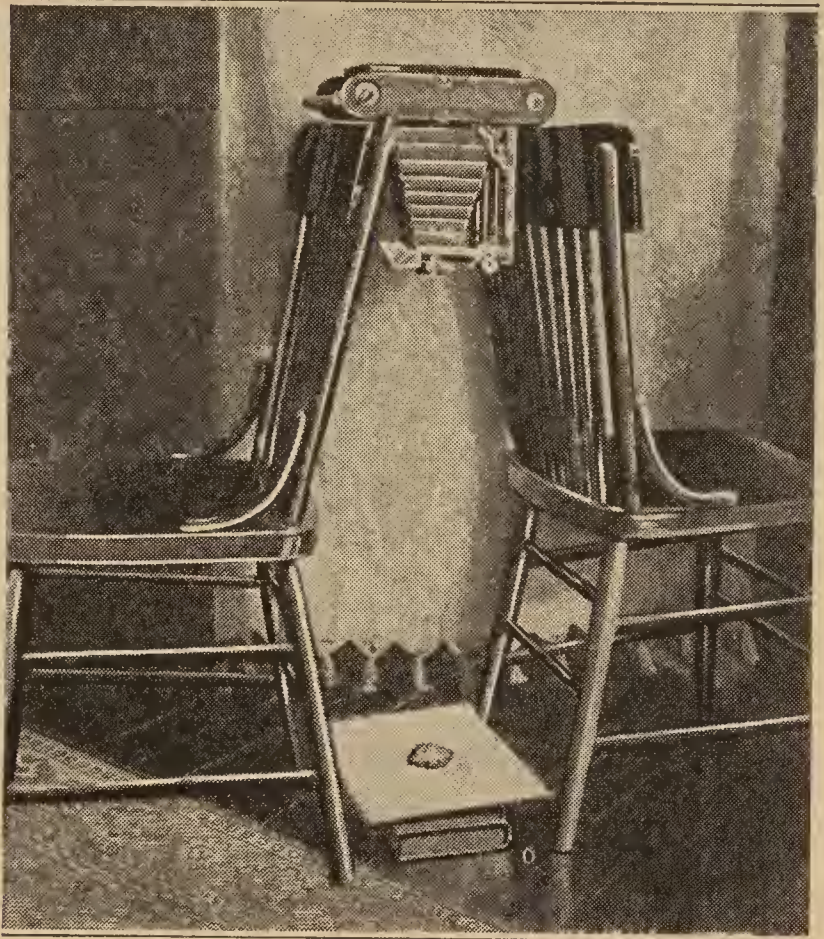
As the common pitcher pump will not pump water to a height of more than 20 or at the most 25 ft. above the water level, it is not generally known that such a pump can be used for pumping water



from a 50-ft. well by raising the water in successive stages. A pump cylinder, set half-way between the pump and water, is operated by the upper-pump lever and delivers the water into a tank set at the same level, from which it is drawn up in the usual manner by the upper pump. The tank is supported on timber crosspieces, and has one end open to admit the upper-pump suction pipe. The lower-pump cylinder is similar in bore and stroke to the upper one, and is attached to the upper end of the lower suction pipe. This is lowered into the well and connected to the tank. The plunger of the lower cylinder is connected to a rod fastened to the pump handle. In this manner, one cylinder discharges at each stroke of the handle.

Photographing Small Articles with a Folding Camera

Flowers, and other small articles that are to be photographed, generally must be supported in some manner, and the



Small Articles can be Photographed More Easily with the Camera Arranged as Shown

materials used to hold the object in a vertical position usually form an undesirable part of the picture unless blocked out on the negative. Practically all the trouble of arranging the articles can be avoided by placing them in the horizontal plane and making the photograph vertically, as in the illustration. The ends of the camera, the lens pointing toward the floor, are supported on the backs of two chairs, which should be of the same height. The object being photographed is placed on a cardboard background that is raised by a stack of books to the proper level for focusing.

"Swimming" in Wading Boots

Many fishermen have lost their lives by wading into water beyond their depth, and, burdened with wading boots, being unable to swim or keep afloat.

The drawing illustrates a method of keeping afloat used by a British sportsman. It should be learned by all fishermen, as very little practice is sufficient to master the idea so completely that it will be found possible to "shoot" rough waters.

Immediately the fisherman gets beyond his depth or trips, he should draw the

knees up to the body, face downstream, and assume a sitting posture in the water. While the head is kept above water, there is, naturally, no danger even in rough,

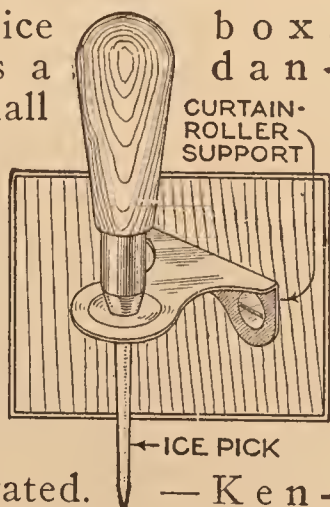


Method of "Swimming" for the Fisherman in Wading Boots Who Goes beyond His Depth

rocky water. To keep direction, paddle with the hands on either side under the water, and if a rock is struck, the first contact is made by the feet and lower part of the thighs. Don't struggle or change posture, for the wash off the rock will help the body to clear it. On no account try to swim, for if this is done, the head goes under and the legs will come to the surface, and unless there is aid at hand there is great danger of drowning. Paddle with the hands, always facing downstream, until shallow water or a landing is reached. This method should be practiced in a pool about waist-deep, that runs downstream into shallow water.

Holder for the Ice Pick

There is no particularly good reason for misplacing the ice pick if a holder is provided for it near the ice box. Since the instrument is a dangerous plaything for small children, it is essential that a holder be used that will keep the pick beyond their reach. Probably the simplest, yet most convenient, holder is one made from a window-shade roller bracket as illustrated. — Kenneth Coggeshall, Webster Groves, Missouri.



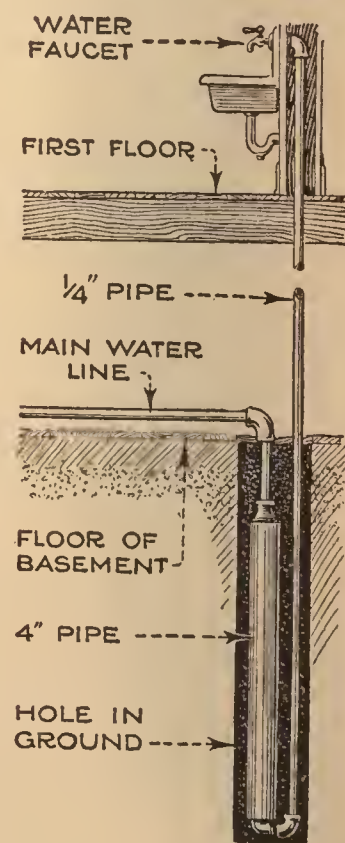
Why Films should be Soaked in Water before Developing

Exposed photographic films, particularly those in a strip or roll, should always be run through a dish of clean water before placing the negatives in the developing solution. The reasons for first washing the undeveloped negatives are good, and the operation will prevent many spoiled pictures. The amateur photographer generally makes the mistake of using too little developer, so that the film cannot be completely and uniformly immersed in the solution. Unless the developer is evenly distributed over the surface of the film, streaks are bound to result. However, if the negatives are first washed, a thin film of water will adhere to the surface, and this will retard the action of the developer, so that the person doing the work will have time enough to get the negatives uniformly covered with developer before development really begins. Dry materials placed in liquids generally cause the formation of air bubbles, and these, on sensitized materials, show up as circular transparent spots on the negative, which, in turn, show black on the prints. Both of these troubles are avoided by the preliminary washing.

Cooling City Drinking Water

Consumers of city water for drinking purposes are usually bothered by the high temperature of the water as it comes from the faucet during the summer months, which makes it almost unfit for drinking unless cooled with ice. In order to lower the temperature of the drinking water, and make it palatable without the use of ice, the idea illustrated was successfully used.

A spot was located directly beneath the faucet, and a small section of the flooring was removed. Then, with a post-hole auger, a hole was bored about 15 ft. deep. The hole was about 8 in. in diameter. An 8-ft. length of 4-in. pipe was connected into the water line as shown, so that the water entered at the



top of the large pipe and passed into the faucet connection at the bottom. After all connections had been made and tested, the hole was refilled with earth, and the flooring replaced. The coolest water is, of course, to be found at the bottom of the cooler, and is drawn off first. What little water is contained in the $\frac{1}{4}$ -in. pipe must be drawn off before the cooler water begins to come through the faucet; for this reason the small pipe is used, so that little water is wasted.—D. C. Stephenson, Augusta, Kan.

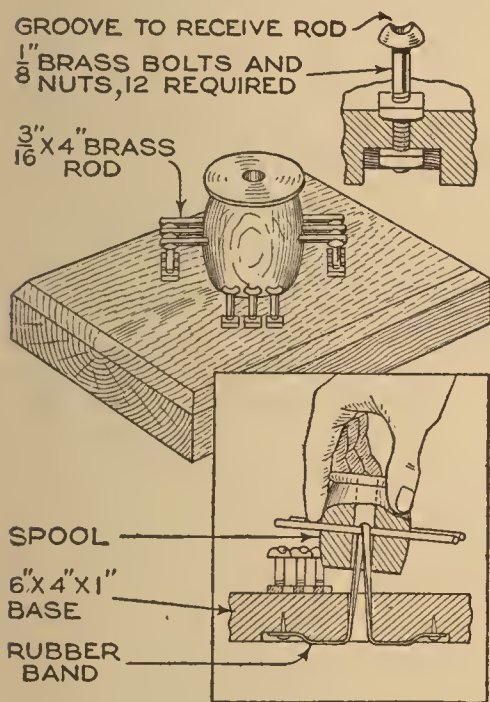
Homemade Three-Pole Double-Throw Switch

Needing a three-pole double-throw switch for a wireless set, at a time when a commercial one was not easily obtainable, a very satisfactory article was improvised, the materials being a spool, with the flange on one end sawed off, three brass rods about 4 in. long, some

$\frac{1}{8}$ -in. brass bolts, a rubber band, two thumbtacks, and a piece of hardwood.

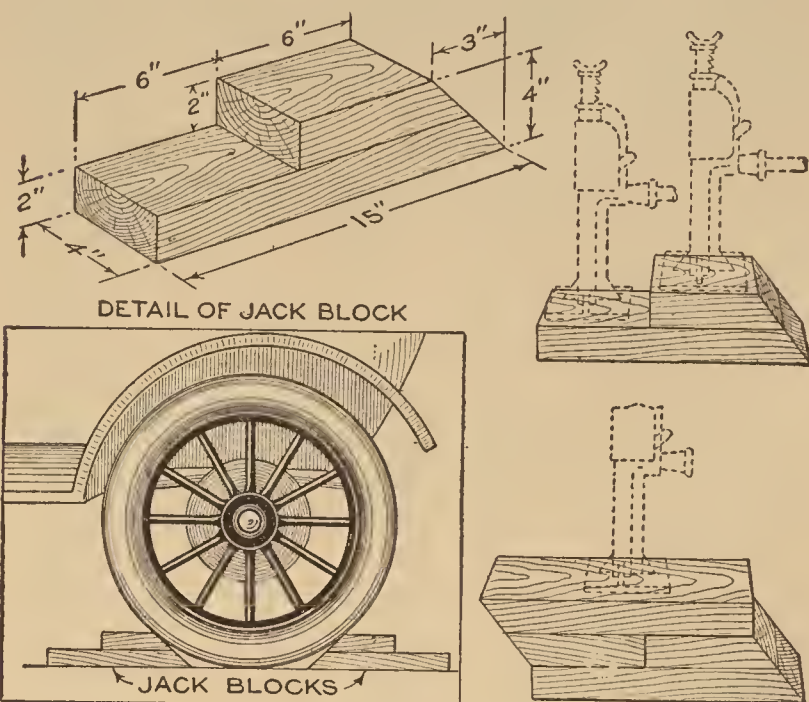
Three holes, a little smaller than the diameter of the rods, were drilled in the spool, parallel with each other, and at right angles to the center hole, as shown. The

brass rods were pressed into the holes so that about an inch of each end extended beyond the spool. In the center of the hardwood block, which was used as the switch base, a $\frac{1}{4}$ -in. hole was drilled. The rubber band was run through this hole, through the central vertical hole in the spool, and over the middle rod, the ends of the band being fastened to the underside of the base with the thumbtacks. This arrangement held the spool down tight, yet permitted it to be lifted and revolved through 90° . The brass bolts forming the contact points were set into the base in four sets of three each, opposite each other. The heads were a trifle higher than the rods in the spool, and semicircular grooves were filed as seats for the rods. The necessary connections were made on the underside of the base.



Blocks for Automobile Jacks

The handy pair of blocks shown in the drawing will more than repay the slight cost and trouble of making them, in the

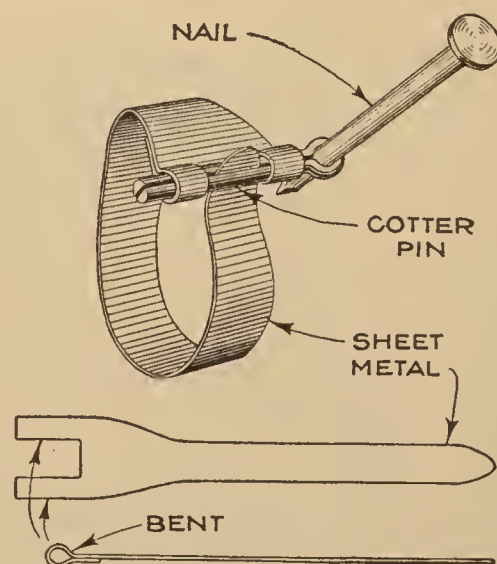


A Set of Jack Blocks, to Provide a Firm and Even Base for the Jack on Soft or Uneven Ground, and to Speed Up the Work

convenience that attends their application as indicated. The blocks can either be made from solid 4-in. timbers, or may be built up from 2-in. planks in the manner shown, and besides serving as a base for the jack on soft or uneven ground, they may be used for blocking the wheels of the car.—C. C. Spreen, Birmingham, Mich.

A Universal Hose Clamp

For simplicity, the hose clamp shown in the drawing can hardly be excelled, as it consists of nothing more than an ordinary cotter pin and a strip of sheet metal. It can be used on any size of radiator hose or wherever such a clamp can be applied. A strip of light sheet iron or other metal is cut to the proper length and provided with ears at the outer end, as shown; they may be soldered or not as preferred. The opposite end of the strip is inserted through the slot in the cotter pin and pulled through as far as possible, after which it can be drawn up as tightly as desired by means of a nail.



A Simple Radio-Transmitting Set

By F. L. BRITTIN

A SIMPLE spark-coil radio-transmitting set can be used where messages are to be sent over a short distance. The complete outfit can be put into a small suitcase, and is well adapted to the needs of outers in motor cars or boats, and for boy-scout field work.

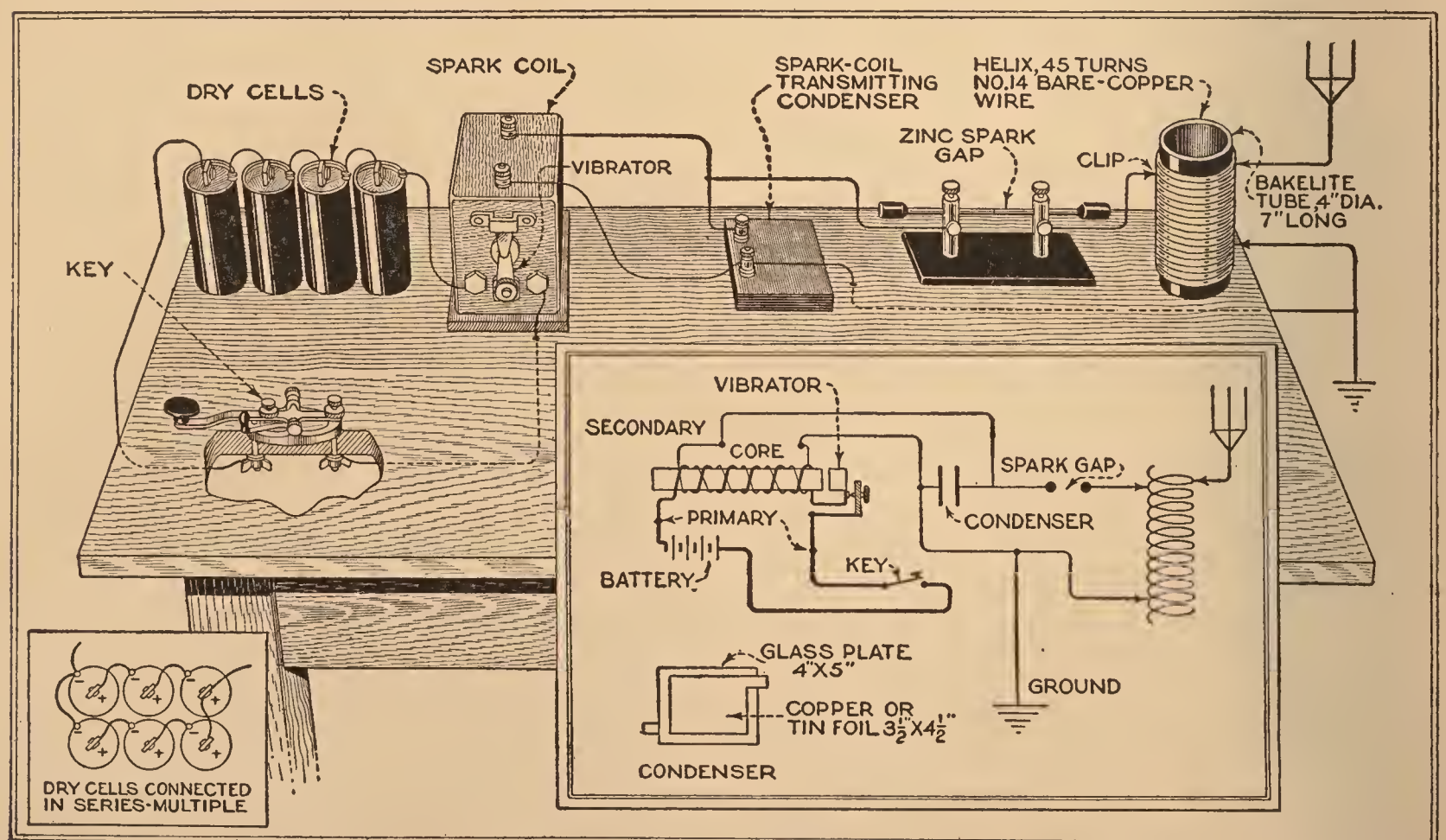
The necessary instruments composing the set are the following: a high-tension jump-spark coil, of which different sizes can be purchased, good results having been obtained for distances up to 16 miles with the ignition coil from a standard light automobile; a key, an ordinary telegraph key answering the purpose, and a spark gap, which may be made from two zinc-battery electrodes mounted in two upright fiber posts. A condenser and helix will also be needed; the condenser stores up the energy, which is then discharged across the spark gap, and produces the oscillations that are thrown into space from the antenna in the form of waves.

The condenser can be made from a number of glass plates with sheets of tinfoil between them. Old 4 by 5-in. or 5 by 7-in photographic negatives, from which the emulsion has been removed, will answer the purpose; the tinfoil sheets are cut $\frac{1}{2}$ in. smaller than the plates, and a tab, or ear, is left projecting for connecting the lead wires to each sheet. In assembling the condenser, the

tinfoil sheets are placed between the glass plates so that the tabs of alternate pieces will project from opposite sides. The condenser unit may consist of five sheets of foil and six glass plates. After assembling, bind the unit together and place in a cigar box, filling the surrounding space with melted insulating compound, or paraffin, to make a compact article for a portable set. If the transmitter is to be stationary, the condenser may be supported on wooden blocks in a pan, into which enough insulating or transformer oil to cover the unit is poured. Any desired capacity can be obtained by adding the proper number of condensers.

The helix consists of 45 turns of No. 14 bare-copper wire, which is wound around a grooved bakelite tube, 4 in. in diameter and 7 in. long. Spring clips are soldered to the wires from the aerial, ground, and spark gap, as shown in the diagram. Four dry cells give good results for short-distance work. When these are used, they may be connected in series, as shown in the upper part of the drawing; another method of connecting them is in series-multiple, as shown in the insert. This distributes the load, and makes the battery last longer.

At the present price of materials, and assuming that all the parts are bought, the total cost of such a set will be about



A Very Simple Transmitting Set for the Radio Amateur: It can be Packed into a Suitcase, Making It Suitable for Boy Scouts or Similar Organizations. All the Instruments may be Made at Home, if Desired, Making This a Very Cheap Set, and One Well Adapted to the Needs of the Beginner

\$15, but this amount can be considerably cut by using materials that are usually available around the average workshop.

The aerial should be well insulated from the ground, but not with porcelain cleats, which should not be used for the aerial of a transmitting set. Solder all wire connections and make all leads short. The ground is important; have the ground wire as short as possible, and fasten it to a water pipe, if convenient, first filing the pipe bright, and either

soldering the wire to it or using a ground clamp.

If the set is to be used in the house as a stationary outfit, a lightning arrester, or ground switch, must be installed on the outside, to prevent lightning from following the wire into the building.

To operate a transmitting station, an operator's license is necessary. Full details of the necessary examination can be obtained from the radio inspector of the district in which the builder resides.

Making Sure of a Sharp Focus

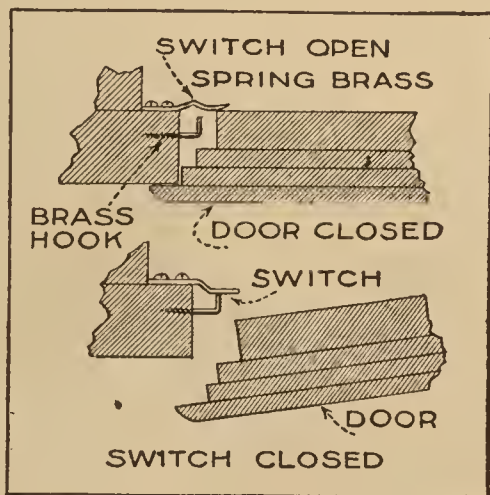
Many photographic exposures, which were apparently sharply focused, turn out to be more or less "fuzzy," because, in fact, they were not properly focused. A simple remedy for this, which makes it possible to focus the image as sharply as possible, consists in using a small magnifying glass, or strong spectacles. This idea can be applied to getting a better view of the subject in the finders of small box cameras, particularly on cloudy days when the image does not show clearly.—Mrs. A. K. Hinkley, Rowley, Mass.

Electric Light for the Refrigerator

Most refrigerators and ice boxes are so located that it is necessary to grope around in total or semidarkness to locate the article desired. All this can be easily overcome by fastening the socket for a miniature

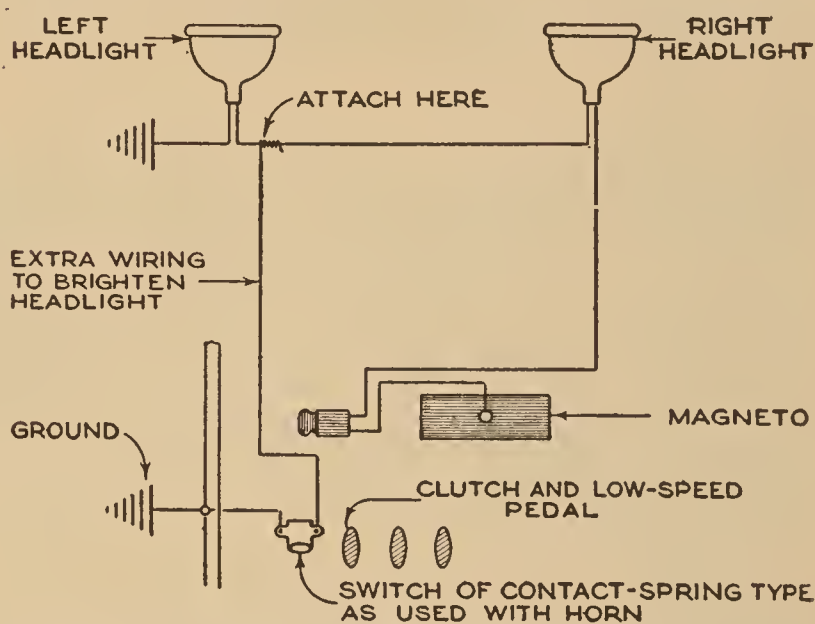
dry-battery lamp anywhere inside the food compartment. The light is turned on and off automatically by the simple contact shown in the drawing.

A piece of spring brass is fastened to the inside wall of the food compartment, and a brass hook is screwed into the edge of the door opening, in such a position that, when the door is closed, the spring contact will be separated from the hook, thus opening the battery circuit and turning off the light. As soon as the door is opened, the two parts of the contact come together and complete the circuit, causing the lamp to light.



Switch to Brighten Auto Headlights

On a light automobile where the headlights are supplied with current generated by the magneto, the lamps usually burn



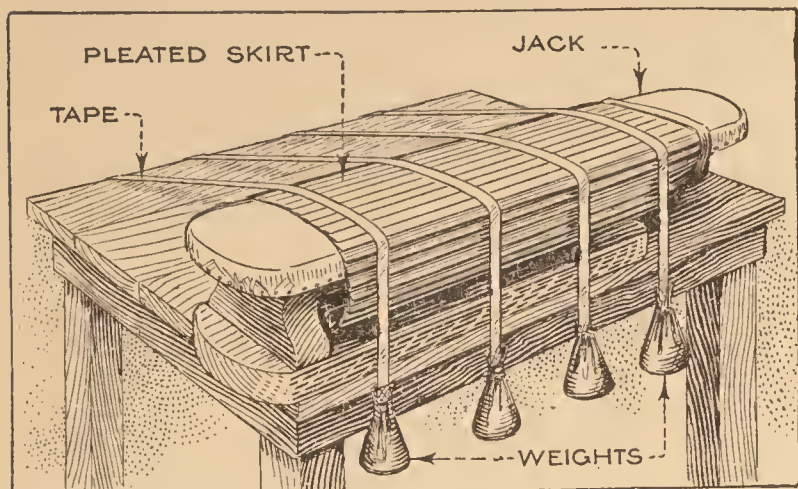
With This Wiring, One Headlight of a Light Car will Burn Brightly While the Car Runs at Slow Speeds

brightly when the car is running in high gear at slow speeds. For country driving, or wherever a bright light is desired with the car traveling at moderately slow speed, a simple arrangement for lighting one headlight brilliantly may be made by placing a push button, such as used for the horn, on the left side of the clutch pedal, running one wire from the button to a ground on the car frame, and another to the light, as shown in the diagram. When this button is pressed, the current flows only through the right lamp, causing it to burn brightly. The position of the button requires the use of the left foot to depress it, and consequently the car cannot be placed in low gear and the motor raced without releasing the pressure on the button, as otherwise the heavy current would burn out the bulbs.—G. A. Luers, Washington, D. C.

☐ A paper cone, slightly moistened inside the large end, can be used to remove small lamp bulbs that are difficult to grip with the fingers.

Pressing Pleated Skirts Easily

An easy way to press a pleated skirt, without the trouble of pinning, is shown in the drawing. Strips of tape are fas-

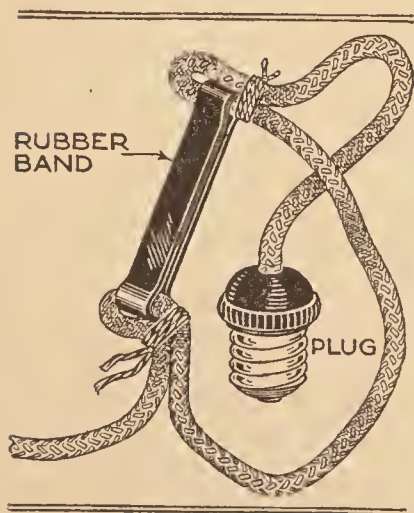


Pressing Pleated Skirts, Capes, and Similar Articles of Wearing Apparel, is Made Easy by Means of the Arrangement Illustrated

tened to the wall or edge of the table, at the desired distance apart, behind the pressing jack. A weight is fastened to the free end of each tape. The pleats are laid in order and held in place by drawing the tapes across the top, allowing the weights to hang over the edge of the jack. The iron can be run over the tapes. This method can be used successfully for either hand or machine pressing.—Alex Mackey, Powers, Ore.

How to Protect Lighting Fixtures When Using Vacuum Cleaner

Many a lighting fixture, to which a vacuum cleaner has been attached, has at some time or another been nearly pulled



from its fastenings because the machine was pushed farther than the wire would permit. The idea illustrated is designed as a "brake" on the wire, and to give warning to the user before any strain falls on the

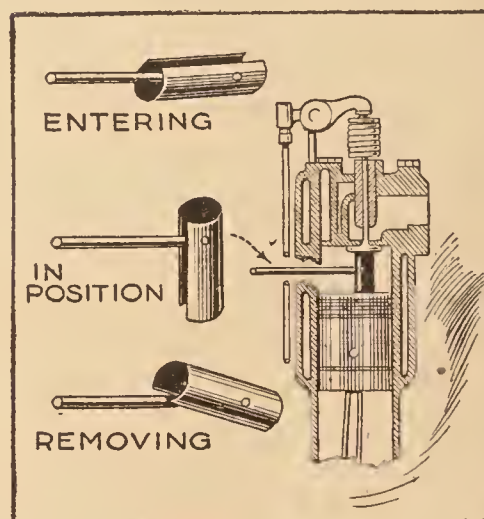
wire. A large rubber band is fastened across a loop made in the wire, 6 in. below the plug. The proper size to make the loop is found by stretching the rubber band as far as it can be done without breaking, and making the length of wire in the loop the same as the extended length of the band.—Mortimer V. Tessier, Nyack, N. Y.

Emergency Gasket Made of Lamp Cord

While on an automobile trip the owner was annoyed by the blowing out of the copper gasket between the exhaust manifold and exhaust pipe, so that the smoke and exhaust gases blew into the tonneau of the car. No stock gasket could be obtained, so a piece of flexible copper wire was used; this was braided into a circular gasket, and served well until a new copper gasket could be obtained.—Chas. H. Willey, Concord, N. H.

Tool Aids in Work on Overhead Automobile-Engine Valves

As the overhead valve with which certain makes of automobile engines are fitted drops down into the cylinder when



the valve spring is released, the usual practice is to unscrew the valve cage and do the work at the bench. But by using the little tool shown in the drawing, the cage need not be removed, as

the valve is held in place through the spark-plug hole; this makes it possible to remove weak or broken springs and replace them with a minimum of time and trouble. The tool is made from a piece of sheet brass, about 2½ in. long, rolled into an open-sided cylinder, pivoted near one end on a handle, so that when inserted through the spark-plug opening, it will fall into an upright position under the valve. The engine is then cranked by hand until the piston comes up and holds the tool against the valve. When the handle is turned upside down, the cylinder falls forward over the handle so that it can be withdrawn. A wooden handle is suggested to prevent injury to the threads of the spark-plug hole.

☞ Cut a hole in the side near the bottom of a wash boiler a trifle smaller than the hexagon on an ordinary faucet, and fasten the faucet to the boiler with solder. A locknut and washer on the inside will give additional strength. This arrangement makes it a very simple matter to empty the vessel.



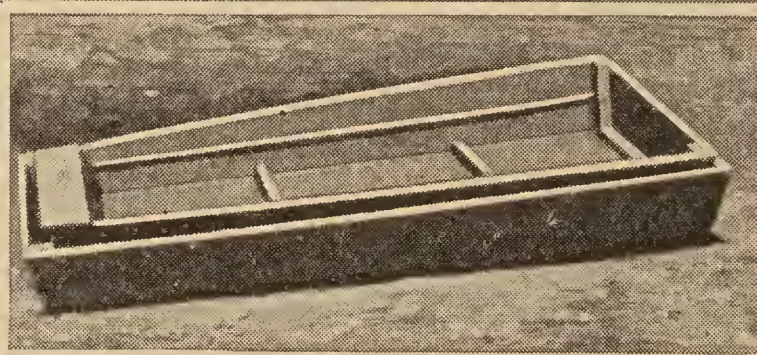
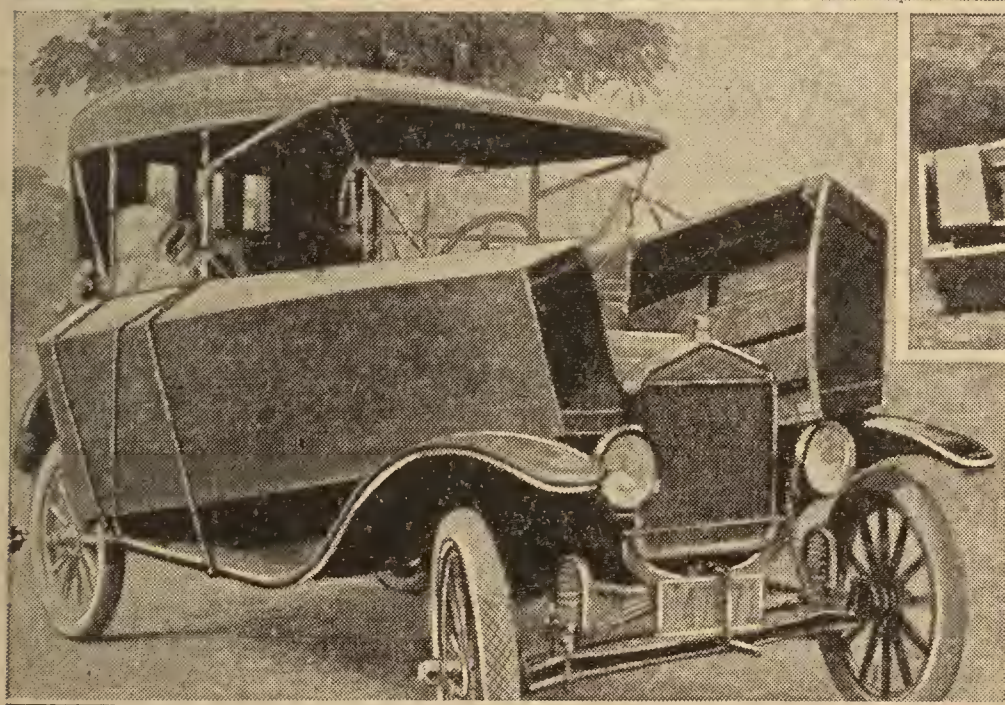
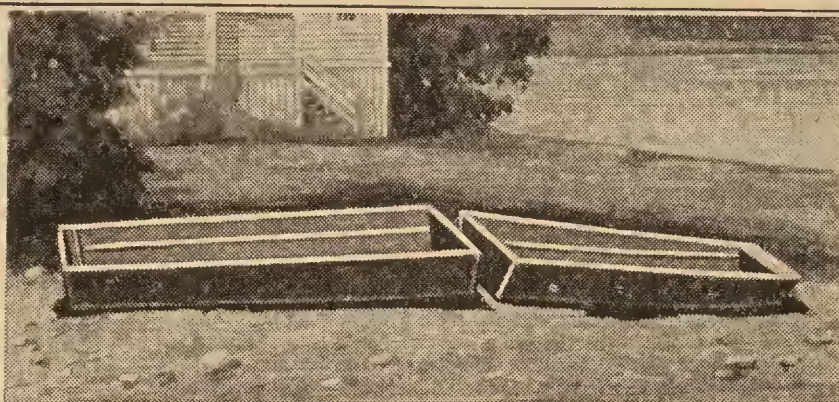
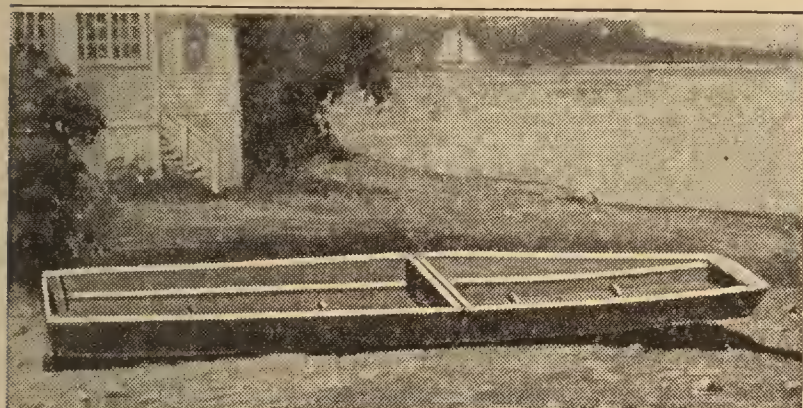
Building a Sectional Flat-Bottom Rowboat

By F. ST. BOULANGER

A NOVEL form of flat-bottom rowboat that has been found very handy on hunting and fishing trips is shown in the illustrations. The boat is made in two sections, and may be transported easily on a light auto; another desirable feature is that, if two men have crossed a stream and one desires to return before the other, he can disconnect and use one section for

in. by 15 ft., for cleats, to be of spruce, the lumber surfaced on all sides; one box of No. 8 flat-head screws, $1\frac{1}{2}$ in. long; 2 lb. of shingle nails, and twelve $2\frac{1}{2}$ -in. stove bolts with washers.

Having obtained these materials, the construction is begun by cutting six cleats from the $1\frac{1}{2}$ by $1\frac{1}{2}$ -in. stock. Both center cleats are the same length; the end



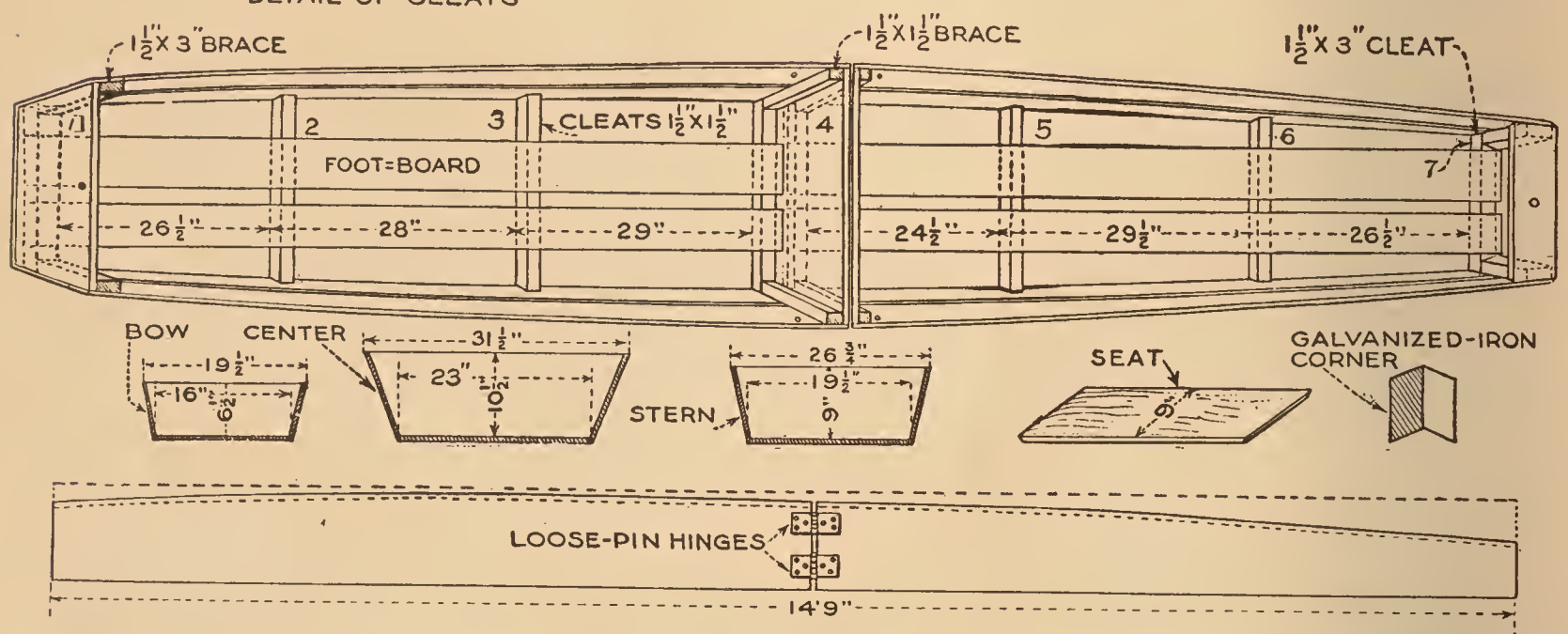
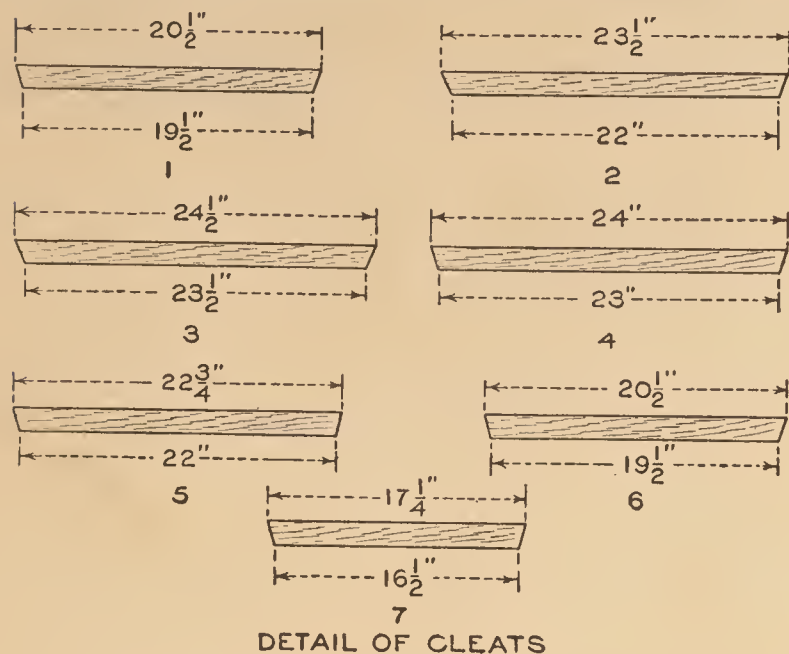
Above: The Boat Sections Shown Fastened Together and Separate. Below: Right, the Sections Nested for Transportation, and Left, Lashed to the Running Board of an Automobile

his purpose, leaving the other section for his partner.

The materials necessary for the construction of the boat are: two boards, $\frac{5}{8}$ by 12 in. by 16 ft., for the bottom; two pieces, $\frac{1}{2}$ by 12 in. by 16 ft., for the sides; one board, 1 by 12 in. by 7 ft., for the ends and centers; two boards, $\frac{1}{2}$ by 5 in. by 16 ft., for footboards, all of cypress; 30 ft. of screen-door molding, for seat rail; one piece, $1\frac{1}{2}$ by 3 in. by 6 ft., for end braces and cleats; one piece, $1\frac{1}{2}$ by $1\frac{1}{2}$

not be correct, and the cleats will not fit the sides of the boat, when finished. Next, take the two boards that are to form the bottom, lay them edge to edge, insert a 1-in. strip of tar paper that has been well coated with roofing cement in the joint, and clamp together; this forms the rough outline of the boat bottom. Then take the two center cleats and nail them in position loosely, with a tar-paper gasket between the planks and cleats. The cleats are nailed so that their inner

edges are $2\frac{1}{4}$ in. apart. When properly set, turn over the planks and screw the bottom to the cleats with four or more screws to each cleat. The remaining cleats and the end braces are applied in



Dimensions and Structural Detail for Building the Two-Section Rowboat, the Halves of Which can be Used Independently by Two Individuals: The Halves of the Boat are Secured Together at the Middle by Means of Loose-Pin Hinges, Fastened to the Sides with Stove Bolts

the same manner, in the positions shown in the drawing. After all the cleats have been set, the planks must be trimmed off at the sides and ends, with a bevel equal to that of the cleat ends. Having done this, the bottom of the boat is finished.

The next step is to cut the ends and centerboards as shown in the drawing, fastening them securely with screws to the proper cleats and braces. Then take one of the boards intended for the sides and tack it so that the upper edge will be flush with the top of the end and center pieces. To accomplish this, it will be necessary to bend the bottom of the boat, thus obtaining the proper curve. The process is repeated on the opposite side, and the boat now begins to take shape. While the boat is thus loosely fastened together, cut the center corner braces from the $1\frac{1}{2}$ by $1\frac{1}{2}$ -in. stock, and the end

braces from the $1\frac{1}{2}$ by 3-in., and fit them as shown. After all the braces are in place, knock off the sideboards and cut gaskets of tar paper to fit every joint, then reassemble the boat piece by piece, tacking the tar-paper gaskets, well coated with roofing cement, in each joint. In the final assembling of the boat it is best to use screws wherever possible, and to space the nails and screws not more than $2\frac{1}{2}$ in. apart. After the final assembling, trim off the waste of the sideboards to fit the boat bottom. Then heat a quantity of roof cement, and, while it is hot, run it into all cracks to insure a water-tight craft. When this is done, fit the bow board, and the molding that forms the seat rail; the latter should be at least 5 in. from the top of the sides. The footboards may next be laid; these are not essential, but make the boat stronger.

Nail the galvanized-iron corners on the outside of the bow and stern, and the boat is ready to be cut into sections. Carefully saw between the centerboards until the two halves are separated, fit the hinges, using stove bolts instead of screws, and the boat is ready for use. In case it is desired to use an outboard motor with the boat, a 2-in. stern board should be used.

Removing Paint from the Hands

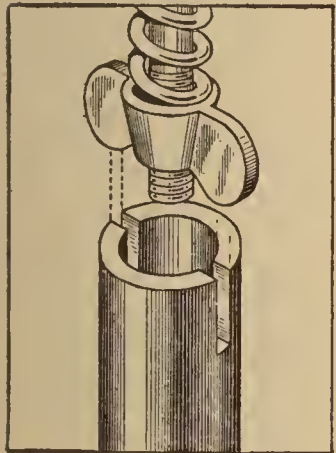
It is not advisable to use turpentine or gasoline in removing paint from the hands, but, by oiling thoroughly with linseed oil, or, in fact, with any fatty oil, and then thoroughly washing with soap, the paint may be removed, provided the stains have not been allowed to become entirely dry and hard.

A Rat Alarm

In places where it is absolutely necessary to keep rats and mice away, it is sometimes more desirable to be apprised of their presence than to keep traps and poisons constantly set for the pests. A simple device that will effectively indicate their presence can be made by mounting some screweyes, about $\frac{1}{4}$ in. from the floor, along the baseboard, then to a height of several feet up the wall, fastening a string to one of these and threading it through the others to a weight which the string is just able to support. The string should be previously boiled in beeswax or paraffin, to which a small quantity of cream cheese has been added. This prevents the string from rotting and serves as a permanent and alluring scent. Rats, on entering, will almost immediately chew the taut string and cause the weight to fall, thus giving an indication of their presence.

Tool for Adjusting Auto Brakes

Those who have undertaken the adjustment of the external, or service, brake of an automobile, by tugging and pulling at the adjusting wingnut between the spokes of the wheel, will welcome anything that will make the work less exasperating. The tool shown is made from a piece of pipe of sufficient diameter to fit over the body of the wingnut, and about 15 in. long, or as long as required. The end of

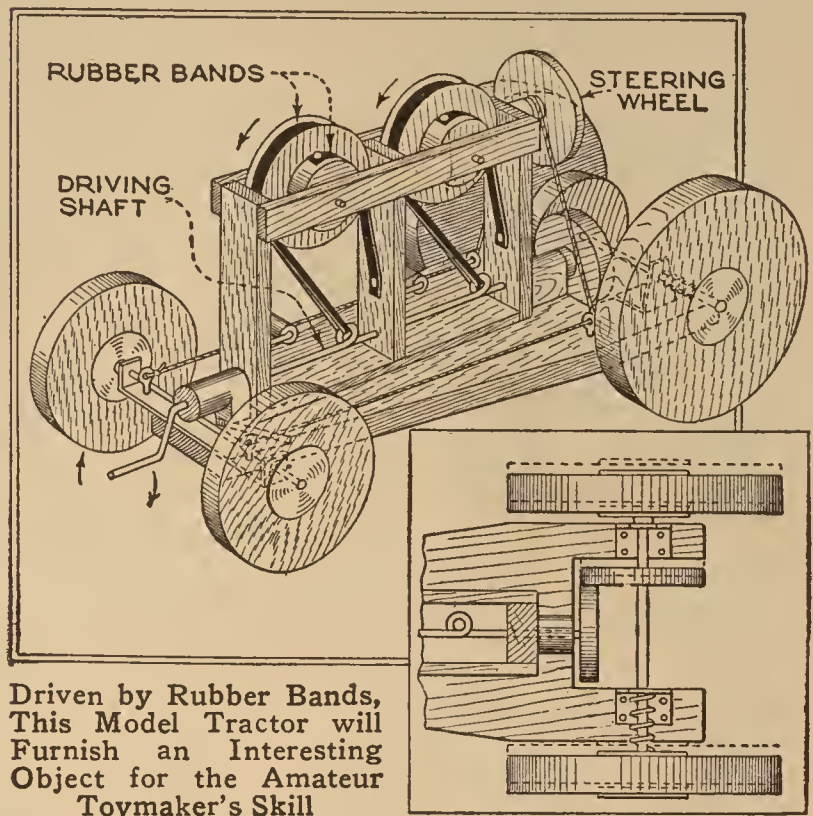


the pipe is slotted to fit over the wings of the nut. A pipe wrench applied to the lower end of the pipe, or a tommy put through holes drilled in it, will run the thumbnut up or down as fast as required.

A Toy Farm Tractor

Driven by rubber bands, but in a manner entirely different from that in which model airplanes are operated, the toy tractor illustrated will furnish interesting work for the amateur maker. Most of the wooden parts are of $\frac{1}{4}$ -in. whitewood, with the exception of the rear wheels, which are made of $\frac{1}{2}$ -in. stuff. The front wheels are made from slices sawed from a curtain pole; tin disks are fastened on both sides at the center of all wheels, for

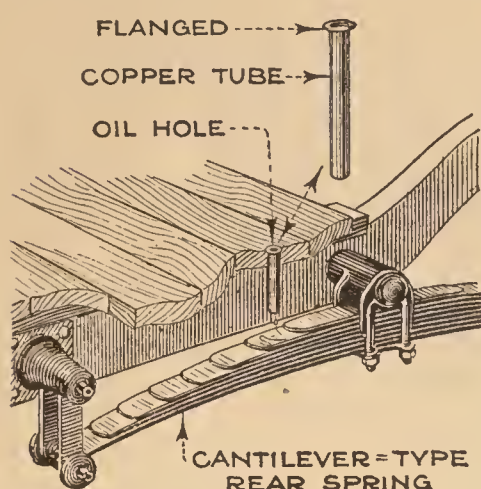
bearings. The axles are lengths of soft-iron wire, the ends of which are flattened; the rear axle is also flattened near one end for a part of its length, to prevent the drive disk from turning. Heavy tin is



used for the axle bearings. The power from the rubber-band motor is transmitted to the rear wheels by means of friction disks, and a small compression-coil spring is placed between the wheel and axle bearing on the side opposite the drive disk, to keep the friction disks in contact. This arrangement also serves as a clutch, allowing the drive disk to run free while the motor is being wound; this is done by pushing the rear axle to the position indicated by the dotted lines in the lower detail. A steering wheel is mounted at the rear of the engine frame, and turns the front wheels by means of a cord fastened to the ends of the pivoted front-axle bearing. In building up the motor, two small disks are fastened to larger ones with small nails, and a short rubber band attached to each small disk and to the frame upright, as shown. A longer rubber band has one end fastened to each of the larger disks, and the other end is fastened to eyes formed on the drive shaft. The disks are then mounted in the motor frame, as shown. After bending the eyes in the driving shaft, it is important that the wire on either side be straightened accurately. The winding band should be nearly $\frac{1}{16}$ in. thick, $\frac{1}{8}$ in. wide, and long enough to reach once around the large pulley, and should be used single. The short band should be about twice as strong as the former, or it may be of the same size and double.—Donald W. Clark, Buffalo, N. Y.

Oiling Auto Springs through a Tube

The owner of an automobile can provide a simple means for oiling the springs to avoid crawling underneath the car.

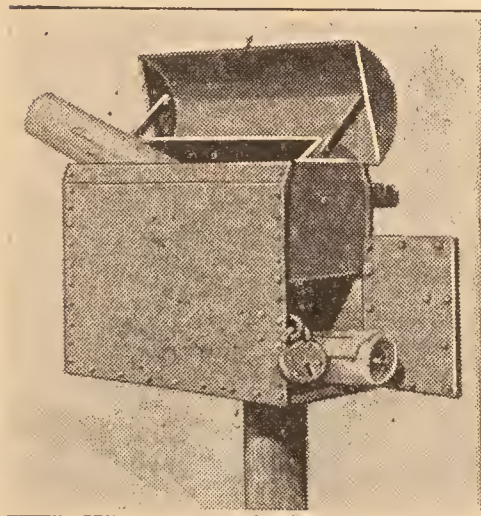


A small hole is drilled through the floor of the car, and a short copper tube inserted to carry the lubricant to the springs. With this attachment, it is only necessary to pour

oil from the spout of an oilcan into the tube. The copper tube should be a snug fit in the hole, and the upper end should be flanged to prevent it slipping through.

Mail Box That is Always Locked

Always locked, yet always open so that mail matter can be placed in it, the rural mail box illustrated prevents unauthorized persons from tampering with the contents. It is necessary to raise the cover to place a letter or parcel inside the box; when the cover is closed the mail is dropped into the box and can only be removed by the person having the key to the lock. The self-locking feature is a



revolving cylinder, one side of which is open; this cylinder is connected to the cover of the box by a short link at each end. The cylinder is supported inside the sheet-metal box by

a bolt or rivet at each end, and is so arranged that, when the cover is lifted, the open side will be brought to the top of the box, ready for the reception of mail matter. When the cover is closed, the cylinder turns so that the opening is downward, allowing its contents to fall into the box underneath.—A. C. Brundage, La Crosse, Wis.

☐ Newspapers, reduced to pulp, make a good filling for cracks in poultry houses.

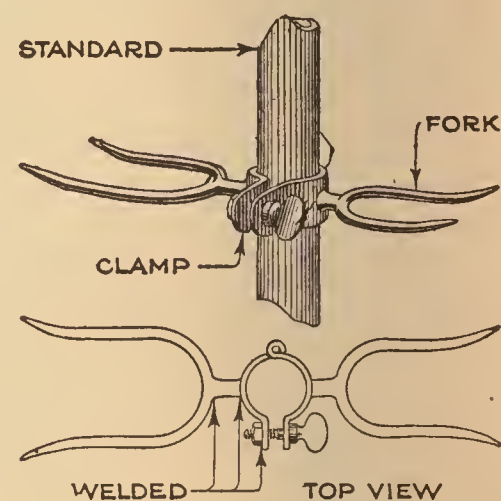
"Towing" without a Towrope

Being out in a car that had stalled and refused to start again, the driver hailed a passing car for a tow home. Neither car was provided with a towrope or chain of any kind. However, the disabled car was carrying an extra tire in the rear and the other car was fitted with a bumper; this suggested the idea of pushing the broken-down car, the bumper of the one car pressing against the spare tire of the other.—Louis Latour, Plattsburg, N. Y.

Music-Rack Attachment Holds Instrument

Amateur and professional musicians often desire a suitable support on which to place their instruments during intermissions.

Such a support is afforded by the device illustrated, which will hold either clarinet or violin, although by modifying the idea, it may be made to hold any instrument. The forks are made of $\frac{3}{16}$ -in. mild-steel rod. The clamp is made of steel, $\frac{3}{4}$ in. wide, and the hooks are welded to it on opposite sides. The completed holder clamps around the standard of the music rack, and is easily and quickly detached.—Edwin Kilburn, Spring Valley, Minn.



Positives Direct from the Camera

Generally, the development of a sensitized plate or film in a camera results in a negative image, the parts exposed to light being darkened. For many experimental purposes, or when the finished picture is wanted in a hurry, it is sometimes of great advantage to be able to make positives in one operation. This can be accomplished by the employment of a simple "reversing" solution, in the process of development. This solution is prepared from 30 gr. of potassium permanganate, 3 dr. of sulphuric acid, and 35 oz. of water.

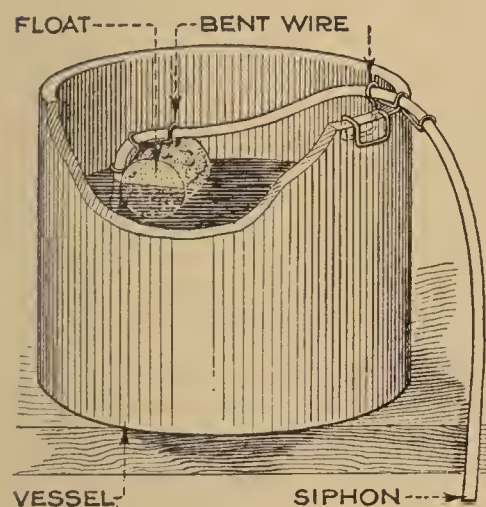
The negative should be developed in the usual developer, but held somewhat longer than usual, and until it is rather

dark. It is next placed into the reversing solution and allowed to remain for three minutes. It should then be returned to the original developer, and the tray carried into the open daylight or under strong artificial light. The reversing solution "eats" away the parts of the image originally blackened in the developer, and the second development, with the sensitive surface exposed to light, blackens the remaining parts of the image, or those not exposed to light in the camera, resulting in a positive image. When the second development has been carried to the proper depth, the sensitized material, plate, paper, or film, is washed and dried, no fixing being necessary.

By substituting bromide paper, cut to the proper size, for the plates or films used in the camera, direct positives can be obtained on paper. The paper will require about five times as long exposure as a plate or film, and the resulting picture will be reversed, as when an object is viewed in a mirror. If the finished positive is too dark, it indicates that the exposure was too short, and vice versa—a point that must be remembered if the first attempts are not perfect; the reversal of the image requires also a reversal of judgment as to the causes of any imperfection.

Siphon Supports and Float

In drawing off the clear liquid or solution from settled or precipitated material

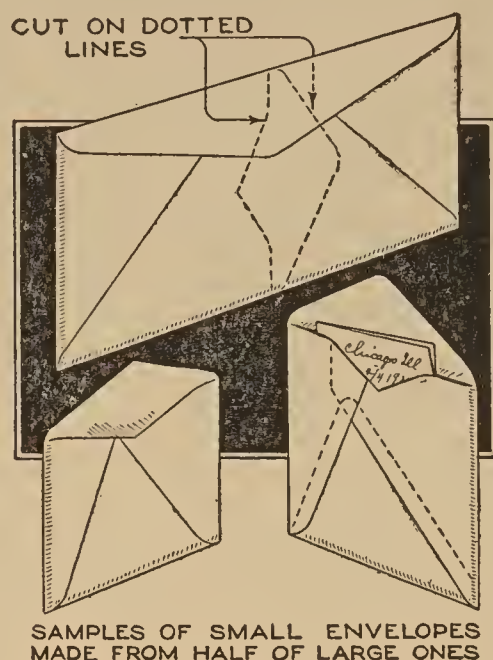


at the bottom of the container with a siphon, considerable care is necessary to prevent the siphon from choking, as well as to keep any of the sediment from being siphoned over.

The drawing shows how both these aims can be accomplished by means of two simple holders, made of stiff wire. One of the holders fits over the edge of the vessel, and prevents the siphon from bending at a sharp angle and stopping the flow. The other is fastened to a tin-can or cork float; the end of the siphon is slipped through the holder, and adjusted so that it cannot reach the sediment at the bottom of the container.—David A. Glushak, Washington, D. C.

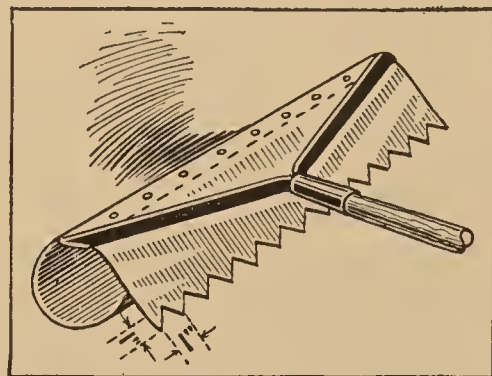
Small Envelopes from Large Ones

When there is no other size of envelope at hand but one of the large "legal" size, and the inclosure is small, an envelope to fit the latter can be made by cutting down the big envelope. The operation is simple and consists in sticking down the flap, and cutting the envelope in two, so that one end will be a little larger than the size necessary. Then a flap is cut, folded over the cut end, and pasted, as in the drawing.



Dandelion Destroyer

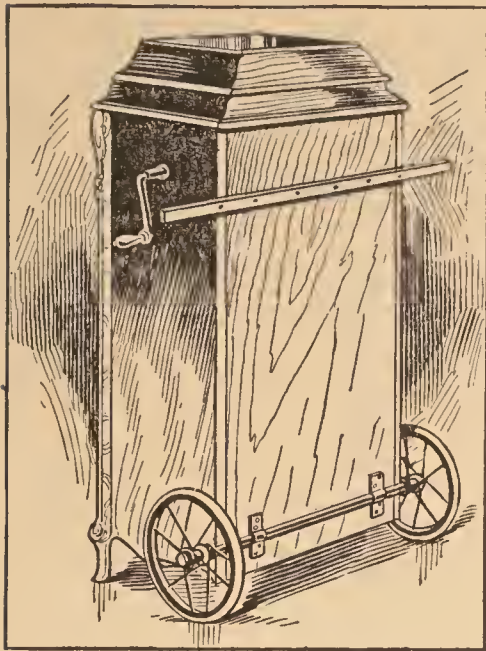
A lawn or yard thickly studded with dandelions presents a discouraging prospect at any time, but particularly when the owner considers digging them out. However, to a certain extent, the spread of the weeds can be controlled by preventing the blossoms from going to seed. The implement shown in the drawing, when pulled across a dandelion-infested lawn before the blossoms ripen, pulls off the flower heads, and thus effectively prevents self-seeding. A 12 by 16-in. piece of heavy galvanized iron, bent as shown, is toothed on one edge, the teeth being 1 in. apart and 1 in. deep. A piece of iron bar is riveted to the sheet iron so that it can be fastened to a handle and used in the same manner as a rake.—Jesse L. Blickenstaff, N. Manchester, Ind.



☐ A small piece of friction tape, or adhesive plaster, used to hold coins sent through the mail, will prevent them from breaking through the envelope and becoming lost. The coin is placed on a sheet of paper, the tape or plaster stuck over it, and the paper folded as usual.

Portable Phonograph for Schools

A four-room school has a phonograph that is used at different periods during the day, in the several rooms, and, until the

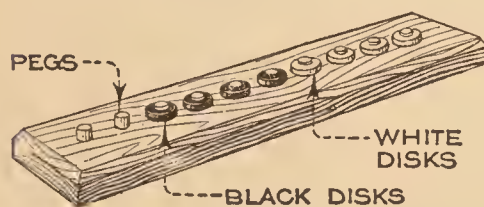


arrangement shown was provided, it was something of a nuisance to be obliged to move the heavy instrument several times each day. Two rubber-tired wheels from a baby carriage were mounted on a $\frac{1}{2}$ -in. shaft and fas-

tened just above the rear legs, which were then cut off. A suitable handlebar was fastened across the back at a convenient height, so that to move the instrument from one room to another, it is only necessary to tip it back until the weight rests on the wheels.—D. R. Van Horn, College View, Neb.

A Ring-and-Peg Puzzle

A short piece of board is provided with 10 short wooden pegs, and eight wooden disks are drilled through the center to fit



over the pegs easily; four of the disks are white and the others are either made of dark wood, or painted black. When the block and disks have been made, the latter are

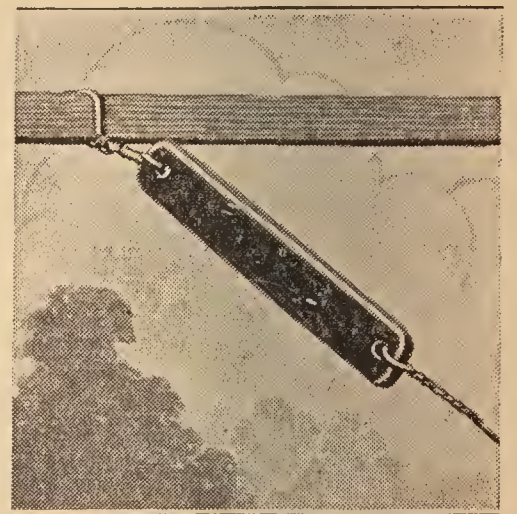
placed on the first eight pegs, white disks alternately with black, the last two pegs being left vacant. The object of the puzzle is to get the four white and four black disks grouped together without leaving any pegs vacant, except two at either end. The disks must be moved two at a time and the rearrangement made in four moves, two disks at a time.

The upper drawing shows the arrangement of the disks at the commencement of the puzzle and the center one shows how the disks should appear at the con-

clusion. The secret of the puzzle is as follows: Move the disks B and C to the vacant pegs I and J; E and F to B and C; H and I to E and F, and A and B to H and I; this gives the necessary transposition, and the disks can be returned to their original positions by reversing the movements.

Insulator for Wireless Antenna

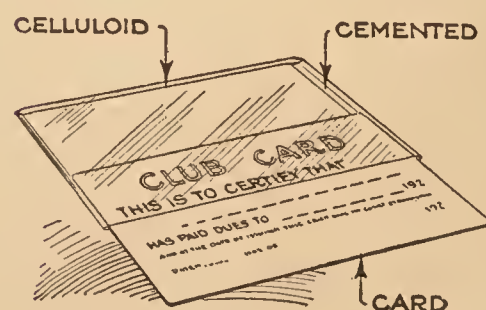
Neat and efficient insulators for amateur wireless aerials can be made from the hard rubber obtained from discarded storage-battery cells, which can be obtained from any battery-repair shop for nothing. The rubber can easily be cut with a hacksaw, or it may



be cut by heating in boiling water for a few minutes until it is soft enough to be worked with a pocketknife, the rough edges being dressed down smooth with a coarse file. A hole is drilled in each end for the antenna wire and guy. The cheapness of an insulator of this type recommends it for small aerials, in the absence of the molded type most commonly used.—Werner J. Baumeister, Cambridge, Massachusetts.

Protecting Identification Cards

Cards that are used continually, such as passes, and lodge and club-membership cards, should be kept clean and presentable. A very simple case for such cards can be made from an old photographic film, after the emulsion has been cleaned off in hot water. A strip of the thin,



transparent celluloid thus obtained is bent around both sides of the card, and about $\frac{1}{4}$ in. on each edge is folded over

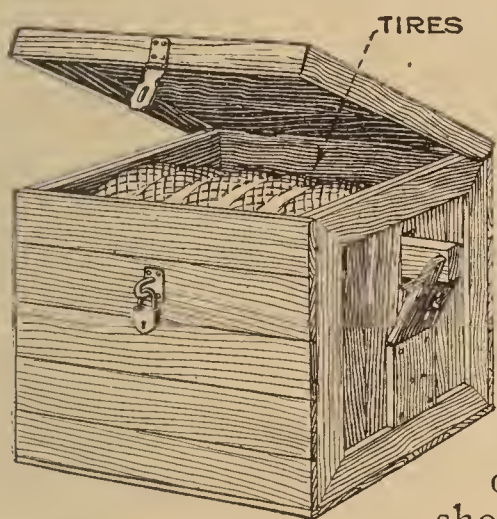
and cemented with collodion, pressure being applied while the cement is drying. With a case of this kind, both front and back of the card are open to view, while protected against wear and dirt.

Keeping Sewing-Machine Belts from Slipping

Sewing-machine belts, especially new ones, occasionally will slip off the upper pulley, even though the belt has been properly tightened. This can easily be overcome by stretching a flat rubber band, about $\frac{1}{8}$ in. wide and $2\frac{1}{2}$ in. long, around the top pulley, and laying it in the groove. After replacing the belt, the slipping will be found to be entirely eliminated, owing to the strong adhesion between the rubber band and the belt.

A Chest for Storing Tires

Every owner of an automobile has felt the need of a safe and convenient place for storing tires not in use, as they are



injured by oil, heat, and light, as well as by standing under weight continuously. Many owners lay their cars up for the winter, and when this is

done, the tires should be removed

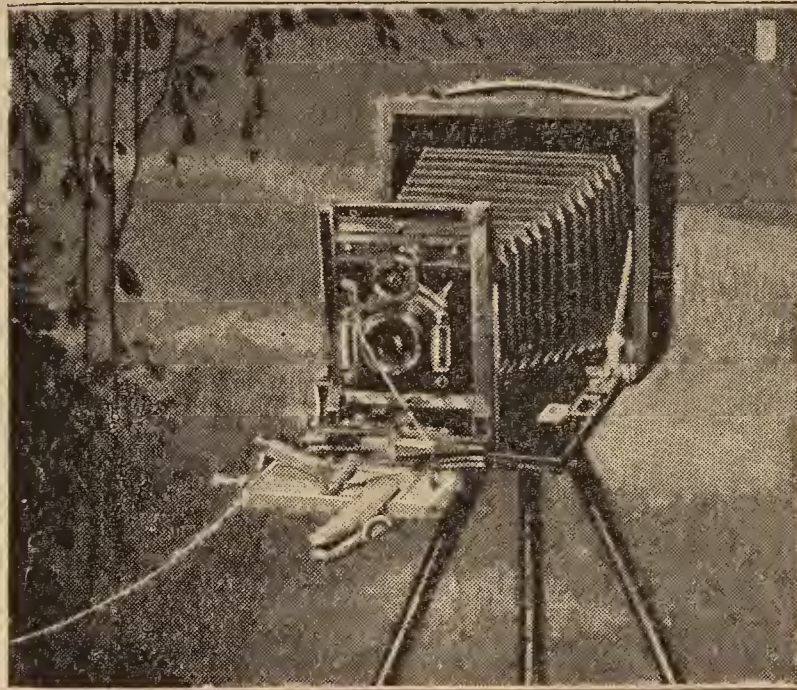
from the wheels, and stored in a chest of the design shown, in which they can be suspended. It should be made large enough to provide ample space for five or six tires. The lumber used in constructing it is tongued-and-grooved stock, to make the box light-tight. A crossbar, longer than the box, slides through slots cut at each end, and can be raised by small pieces of wood, as shown, so that the tires can be lifted to clear the bottom of the box. Small bolts, screwed to the wooden pieces, fit into holes drilled in the crossbar, to hold it steady. A padlock should be provided to protect the tires against theft.—M. V. Tessier, Nyack, New York.

Mousetrap Trips Camera Shutter

In photographing wild birds and animals, it will be found that a mousetrap can be used to advantage for automatically releasing the camera shutter, when the object to be photographed is at the proper focal distance from the lens and directly in line with it.

As shown in the photograph, the

mousetrap is attached to the bellows track by a clip. A strong thread is attached to the shutter trigger and mousetrap, and is adjusted so that it is just tight



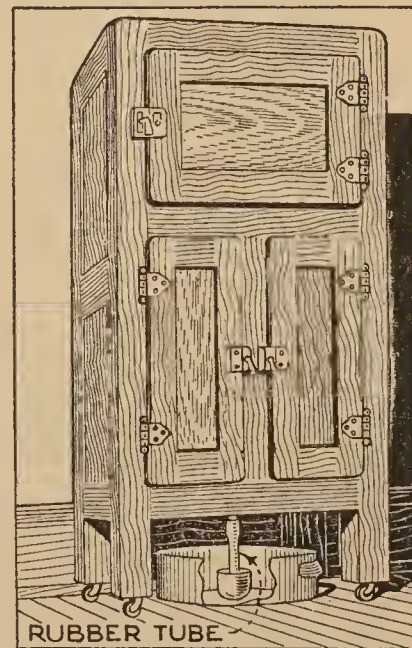
A Common Mousetrap Attached to a Camera may be Used to Trip the Shutter Automatically When Photographing Wild Birds and Animals

enough to snap the shutter when the trap is sprung. Another string is attached to the bait pan or hook, and, after being passed around a pin on the trap base, is led to the nest or lure. Only a slight movement of the string is required to spring the trap and release the shutter.

With a shutter speed of $\frac{1}{10}$ second, and the lens open at U. S. 4, the negative will receive ample exposure in the shade.—W. W. Baumeister, Cambridge, Mass.

Making Icebox More Efficient

A simple and effective method of saving ice in the household refrigerator is shown in the drawing. A rubber tube is fitted over the drip pipe, and the lower end is placed in a cup set in the drip pan. The cup is always kept full, and there is thus a water seal at all times on the drip pipe, preventing warm air from ascending the latter and melting the ice. Before this device was used,



we consumed an average of 175 lb. of ice per week. Since fitting it, this has dropped to 125 lb. per week.—W. S. Wilson, Woodlawn, Pa.

Flower-Bed Borders from Auto Rims

The photograph shows the novel and not unattractive result made possible by using old automobile tire rims as the

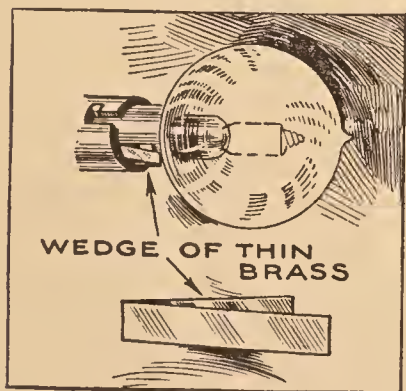


Novel and Attractive Arrangement of Flower Beds Formed by Planting Flowers and Plants inside the Circle Formed by Old Automobile Tires and Rims

borders for flower beds. Not only can the rims be used in this manner, but old tires will also serve the purpose. The rims or tires are first painted white, the space within them filled with earth, and the flowers or plants set inside the circle thus formed.—F. J. Hiscock, Cody, Wyo.

Preventing Vibration of Headlight Bulbs

The bulbs of automobile headlights often fit rather loosely in their sockets. This gives rise to vibration when the engine is running, and is not only annoying to the pedestrian meeting a car carrying



such flickering lights at night, but shortens the life of the bulb filaments. To overcome the trouble, a wedge of thin spring brass can be slipped between the lamp base and its socket. The wedge is made by doubling the brass strip, as shown, and filing the doubled end to form a sharp edge; the wedge is laid against the lamp base, and the two pushed into the socket together.—L. B. Robbins, Harwich, Mass.

Tightening Loose Pipe Stems

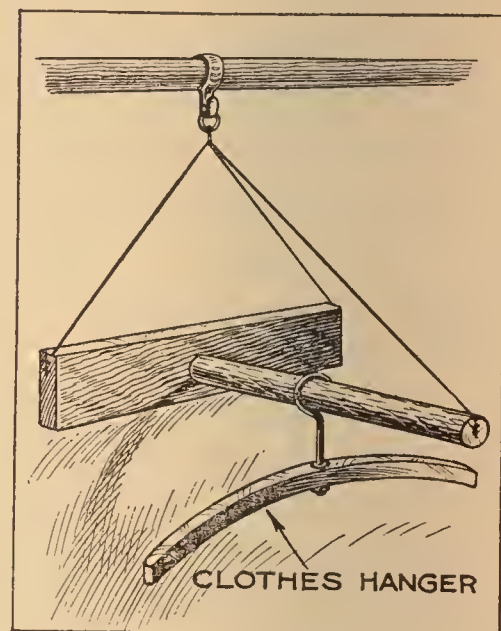
When a hard-rubber pipe stem becomes loose in the pipe, it can be expanded easily to make a good fit. It is only necessary to immerse the loose end of the stem in boiling water for a few minutes

to soften it. Then, a nail, or piece of wire a trifle larger than the bore of the stem, is inserted into the bore while the rubber is still soft, and allowed to remain until it has hardened again. If the stem has been expanded too much, it can be dressed down to a good fit with sandpaper or with a fine file.—Wm. J. Volk, Woodhaven, N. Y.

A Hanger for Clothing

Sometimes it is necessary that clothing be hung in a room where no wardrobe or closet room is provided. Placing hang-

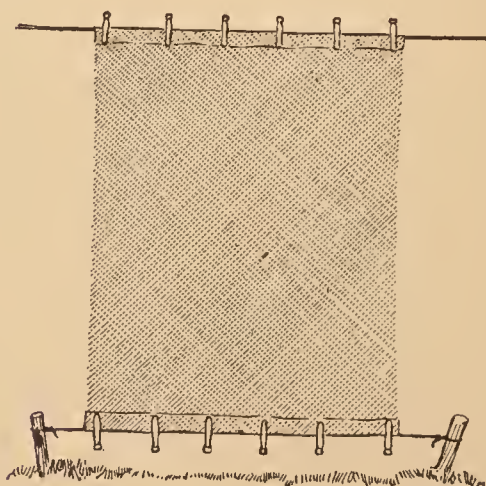
ers on the wall is usually out of the question, as it mars the plaster, but if there is a picture molding around the room, a hanger like the one illustrated can be used to advantage. It is



made from two short pieces of wood, one preferably being round, as shown, fastened together at right angles. Three wires, one from each end of the wooden pieces, unite at the same point and are fastened to a ring. The hanger is then suspended from the molding by a picture hook. The clothes, on hangers, are hung from the projecting piece.

Stretching Curtains without a Frame

One can dry lace curtains, without using expensive and cumbersome curtain



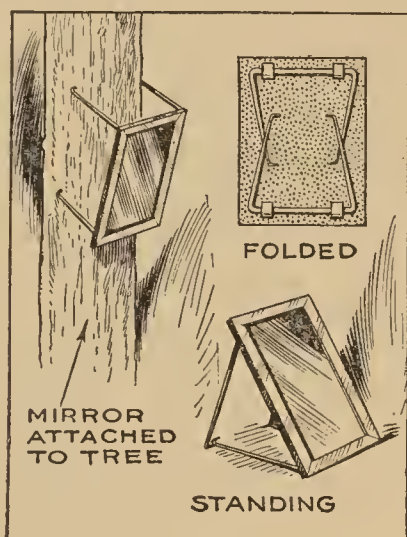
stretchers, by means of the simple arrangement illustrated. As shown in the drawing, one edge of the curtain is pinned to the regular clothesline, while the other edge is similarly fastened to another line, parallel with the first, and fastened to pegs driven into the ground.—R. E. Deering, Clements, Kan.

Cutting Lawns in Dry Weather

In dry weather, it is sometimes advisable to allow the grass to remain a little longer than the mower will ordinarily cut, when the cutter has been elevated as high as possible by adjusting the roller. If the lawn is large, the strain of pushing down on the handle soon becomes exhausting. To relieve this strain, I obtained three pieces of old belting, 2 in. wide, and tacked these around the roller, one on each end and one in the center.—Jas. C. Bailey, Indianapolis, Ind.

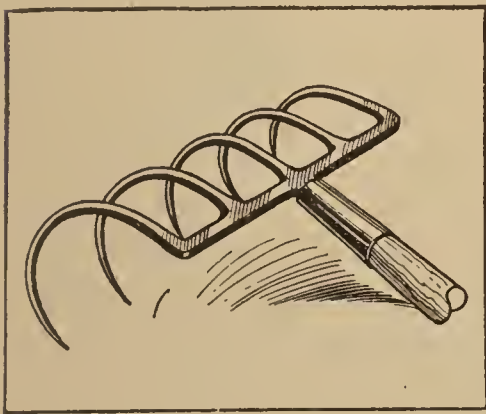
A Handy Mirror for the Camp

A handy mirror that will add to the pleasure and convenience of camping can easily be made from almost any ordinary mirror provided with a metal back or a wooden frame. Two spring-wire members are fastened to the top and bottom of the mirror, so that it can be attached to a tree, tent pole, or other vertical support, or set at an angle on the table. In the case of a wooden-framed mirror, the pointed wires can be attached with small staples driven into the frame, while with a metal-backed mirror or one having a metal frame, small strips of tin must be soldered to it to hold the hooks.—Doris Johnson, Rockford, Ill.



Litter Rake Made from a Pitchfork

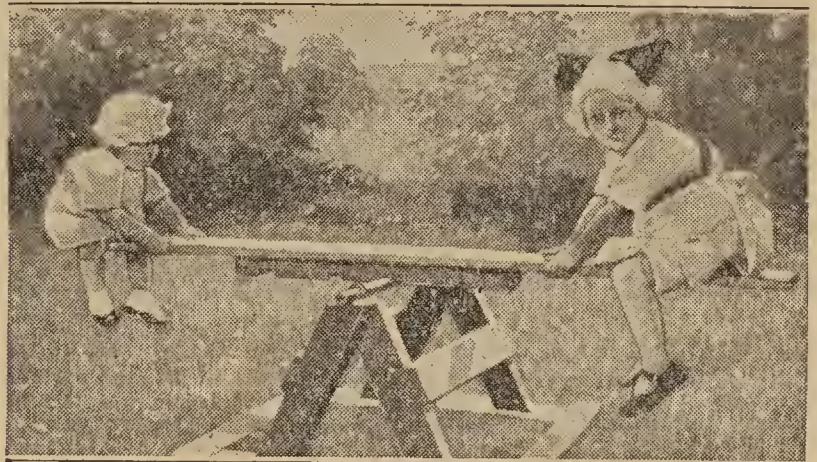
When a rake is needed, either on the farm, for removing litter, or in the factory, for pulling out chips from underneath machines, the implement illustrated will be found serviceable. It can be made from any ordinary wide fork. The



tines are heated and bent over in a curve so that all the points will be in line.—Louis Schneider, Clinton, Mo.

An Adjustable Seesaw

The usual form of a children's seesaw—a plank placed on a buck—provides no adjustment for the unequal weight of chil-

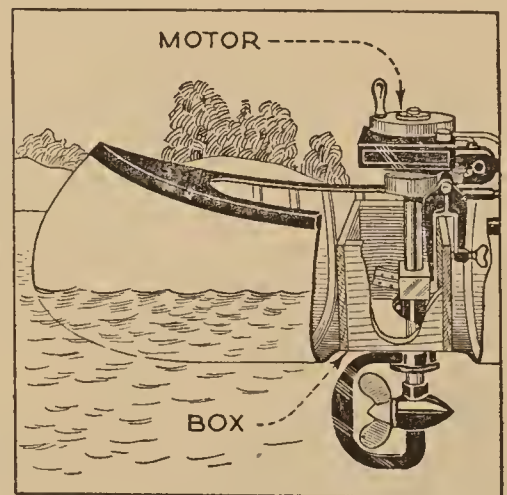


This Adjustable Seesaw Makes It Possible to Establish a Balance When It is Used by Children of Unequal Weight

dren of different ages. This defect is readily overcome, as in the seesaw or teeter board illustrated. On the underside of the plank, a series of blocks or a notched board is placed so that the distance from the center to the ends of the board can be varied as necessary. The board is supported on a piece of pipe across the top of a simple horse.—E. E. Johnson, Inglewood, Calif.

Mounting Rowboat Motor in a Canoe

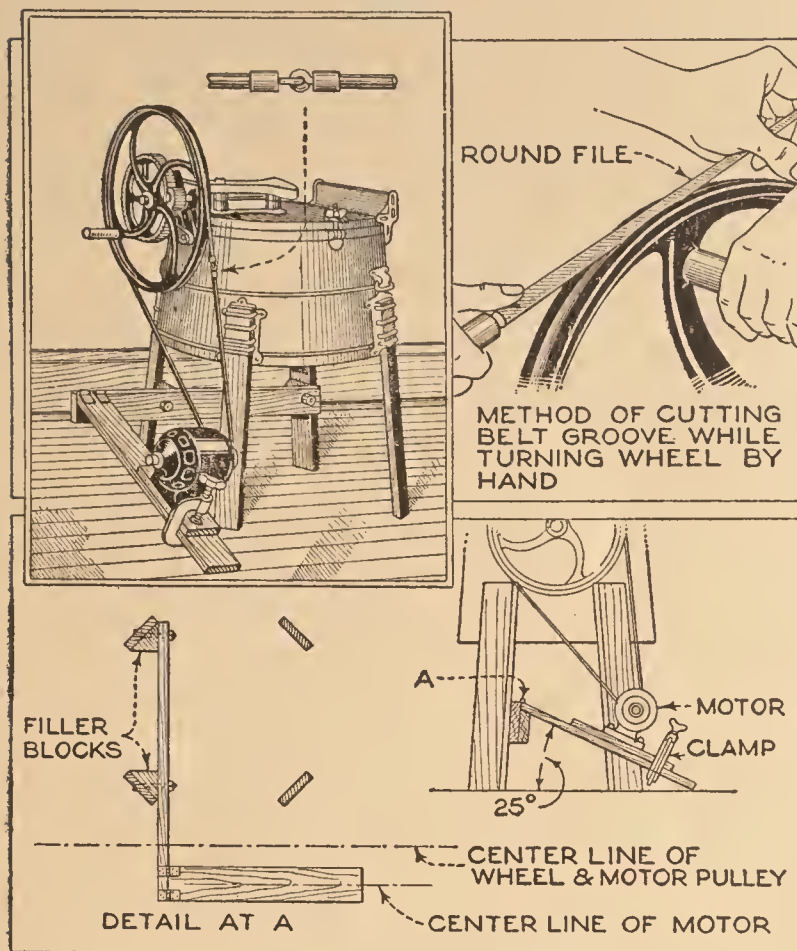
Placing a rowboat motor in a canoe is a problem that many have been compelled to give up, but it can be done in a workmanlike manner by setting a wooden box or well into the craft, in the manner shown, and attaching the engine to the edge. The box itself must be water-tight, and the joint between it and the bottom of the hull must also be made water-tight by calking or other means. The top of the box should be nearly as high as the sides of the canoe and should be well braced to insure rigidity. Such an arrangement becomes a permanent fixture, but does not prevent the canoe from being used without the engine.



□ A piece of rubber matting underneath the rugs on polished hardwood floors will prevent them from slipping.

Attaching an Electric Motor to a Hand-Power Washer

An ordinary hand-power washing machine of the type shown can be easily ar-



A Hand-Power Washing Machine Modernized by the Addition of an Electric Motor: The Motor can be Removed and Used for Other Work

anged for electrical drive, practically the only expense being the purchase of the motor and belt. The washing machine is not altered in any way that would prevent it from being operated by hand in case it should be necessary.

A board is fastened to two legs of the machine in the position indicated; it is possible that triangular filler blocks will have to be used between the board and the legs, as illustrated in the detail drawing, in order to make a solid job. Another board, the motor base, is connected to the end of the stationary horizontal board by a pair of hinges. The motor is mounted on a wooden block and clamped to the hinged board as shown, so that the motor pulley and the washing-machine hand-wheel are in line. A round belt is used for driving the washer, and consequently the handwheel must be grooved; this is done by holding a round file against the rim of the wheel as it is revolved by hand. When clothes are to be put into the machine or taken out of it, the hinged motor base is raised and the belt removed. By mounting the motor on a block and clamping it to the washing machine in this manner, it can be removed instantly and used for other purposes.

Garden Hose as Substitute for a Spray Pump

The use of a garden hose for spraying is especially suited for trees, vines, and shrubs within reach of the hose. The spraying mixture is poured into the hose, which is then attached to the faucet, and the water turned on to force the mixture out through the spray nozzle in a fine mist.

To fill the hose, the nozzle should be opened to let out the air as the solution is poured in through a funnel at the faucet end, the nozzle end, of course, being elevated, so that the liquid cannot run out. When the hose is filled, the nozzle is closed and the hose screwed onto the faucet. Fifty feet of hose will hold about a gallon of the spray solution. When all is ready, the water is turned on slightly, not full force, and the nozzle is partly opened; this forces the solution out through the nozzle. The color of the spray will indicate the moment when the clear water has entirely displaced the solution. Before refilling the hose with the spray mixture, the water must be drained from the hose.—James T. Ford, Hollywood, Calif.

Partitions for Catalog Files

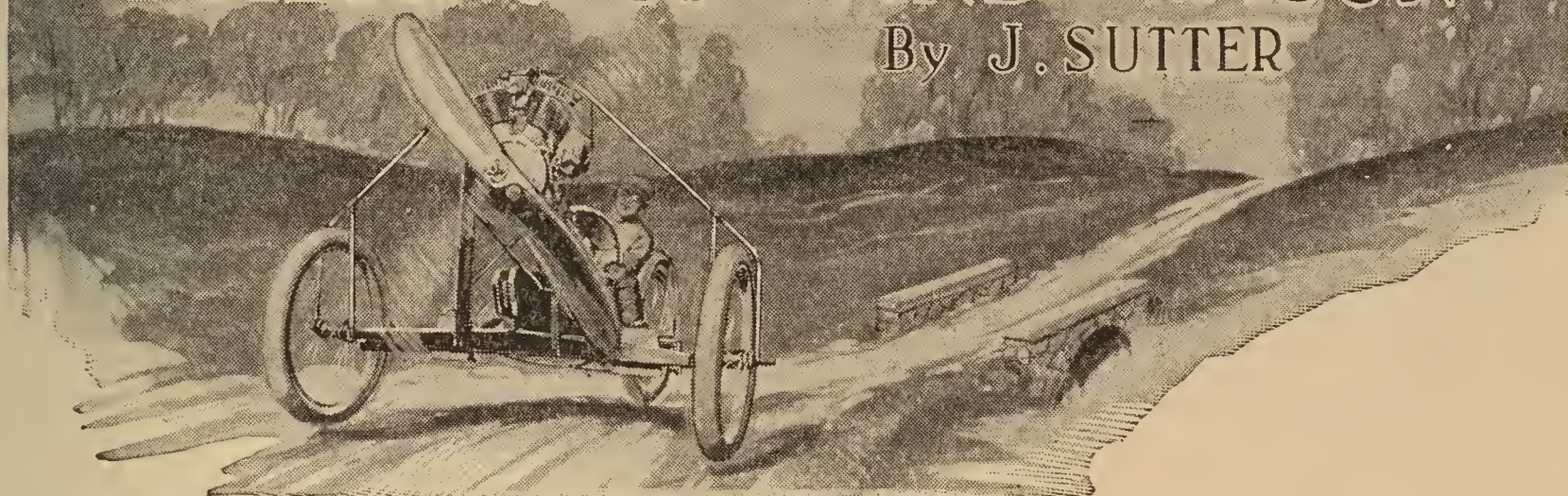
In places where a large collection of manufacturers' catalogs are kept on file for reference, on shelves, as is the general practice, the whole lot falls over at an angle when one or more of the volumes are removed.

A good way to prevent catalogs, or, even books, shelved in this manner, from falling over, and yet preserve the alphabetical arrangement, is to make removable upright partitions. Such partitions are easily made by fastening pieces of sheet metal at right angles to blocks of wood of the proper size, the ends of the metal sheets being held down by the weight of the catalogs, and the filing letters stenciled or marked with gummed letters on the edges of the blocks.—P. A. Daschke, Astoria, N. Y.



BUILDING A WIND WAGON

By J. SUTTER



A WIND wagon, that can be built by almost any amateur mechanic, is shown in the accompanying illustrations. When powered with a motorcycle engine running at 1,000 r.p.m., it is capable of developing a speed of from 45 to 50 miles an hour, and will climb a hill with a 20-per-cent grade with ease; steeper ones can be climbed if a little start can be obtained before attacking the slope.

The construction of the frame should be undertaken first. As shown in Fig. 2, this consists of two 1 $\frac{1}{4}$ -in. angle irons, placed in the form of a triangle. The front axle is a piece of 2 by 3-in. hardwood, cut as shown in Fig. 3, and is bolted to the ends of the

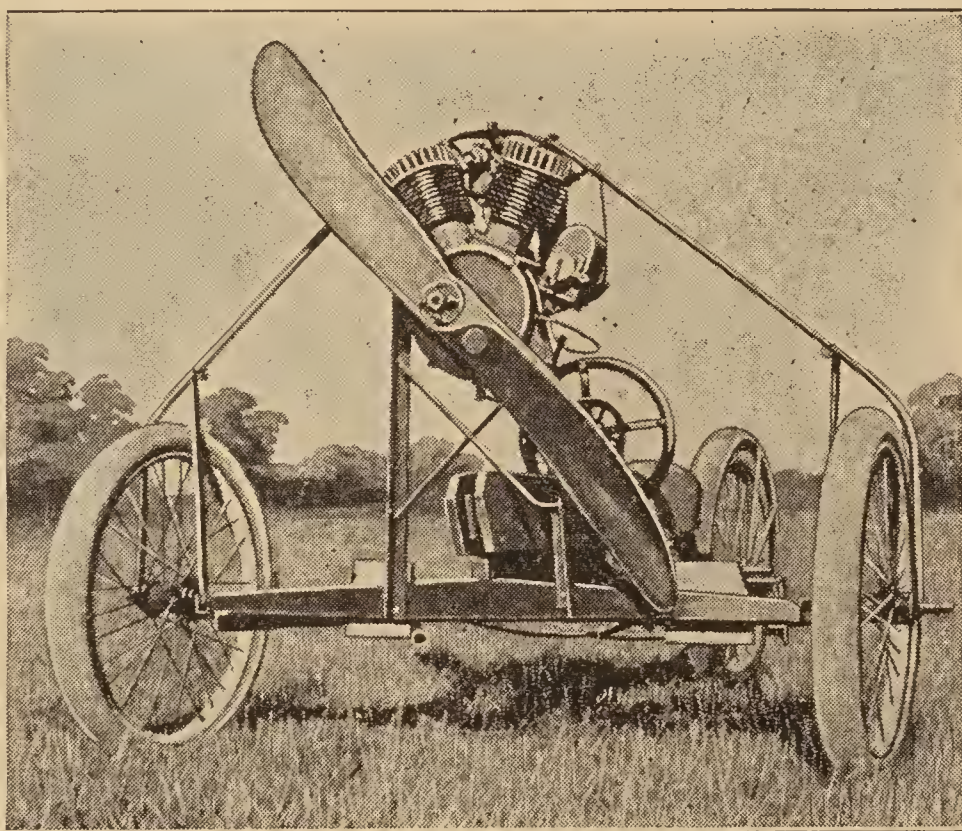
angle irons. A motorcycle front-wheel fork is connected to the rear end of the frame, as in Fig. 8, by short lengths of angle iron. As the connections for different makes of motorcycle forks may vary somewhat, this connection has merely been indicated in the drawing; it is necessary, however, that the fork be mounted so that it may swing, as the rear wheel is used for steering. A guide, made of $\frac{3}{8}$ -in. pipe, or flat iron, is bolted across the frame, as shown in Fig. 8, on which the fork slides. A motorcycle rear wheel is slung in the fork, and fitted with a mudguard, as shown.

Motorcycle front wheels are used for

the front of the wagon, and are fastened to the axle by means of pieces of $\frac{1}{2}$ by 2-in. flat iron, bent L-shape, and with the longer leg bolted to the underside of the axle, as shown in Fig. 3.

The engine frame is next built up. This is made of 1 $\frac{1}{4}$ -in. angle iron, bolted to the front axle, and connected by tie-rods, as

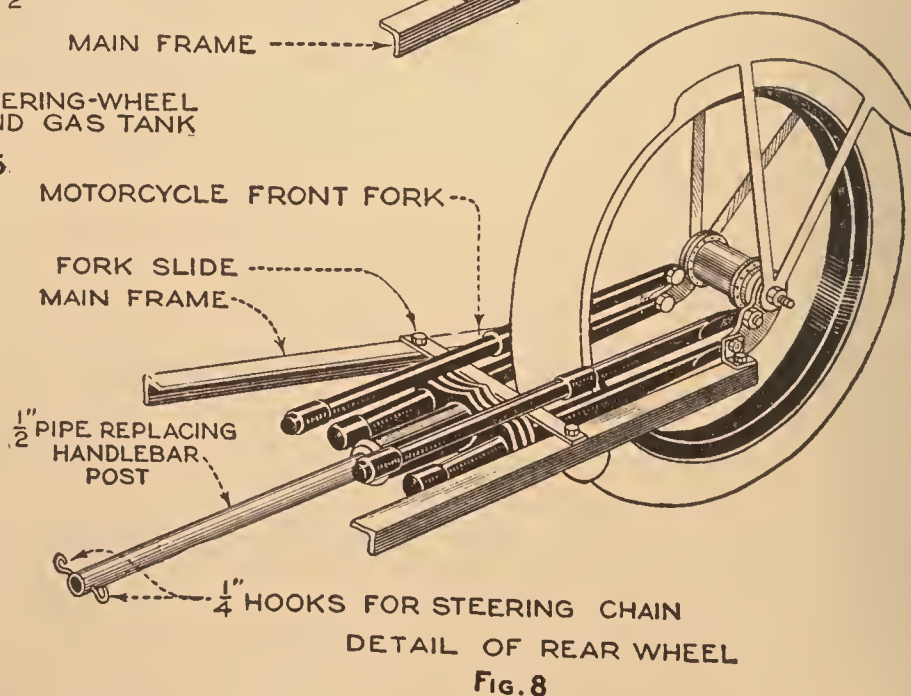
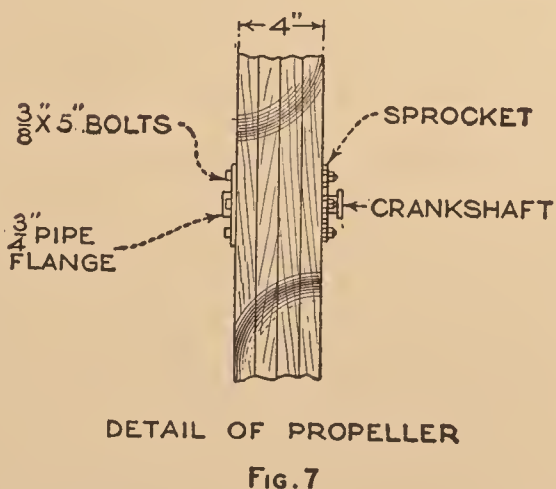
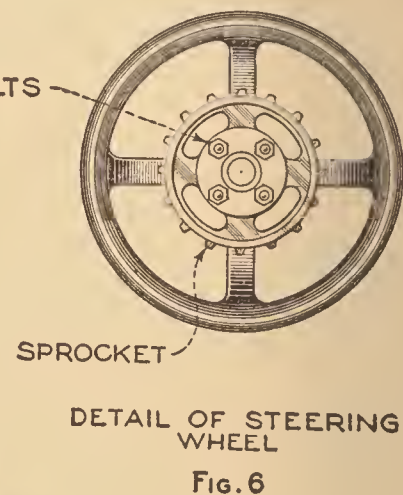
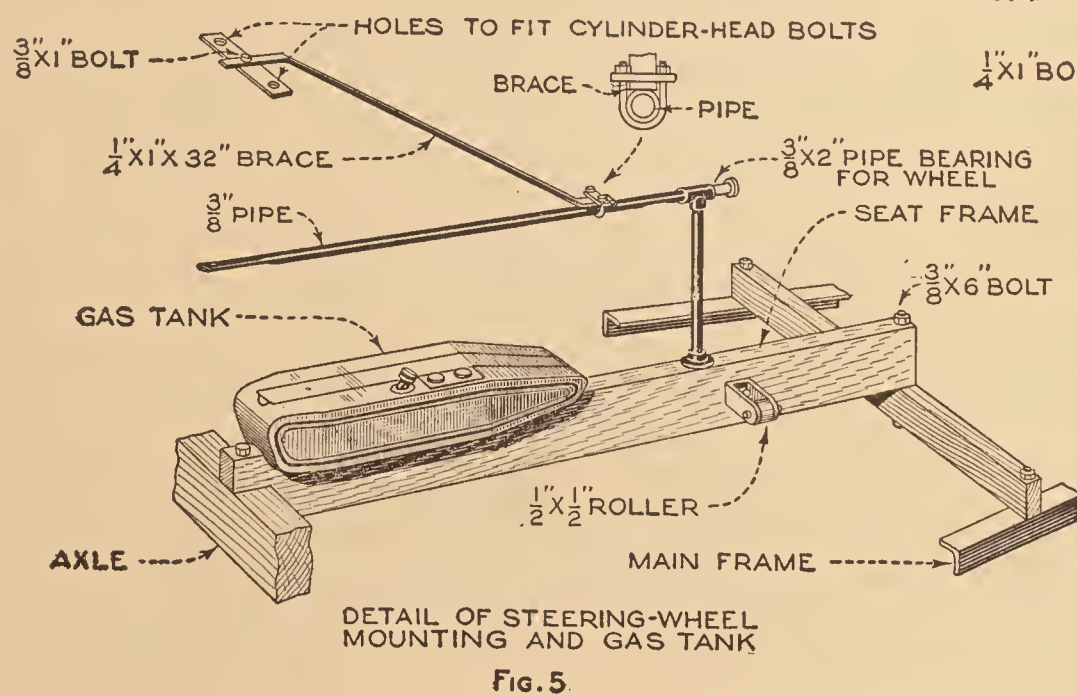
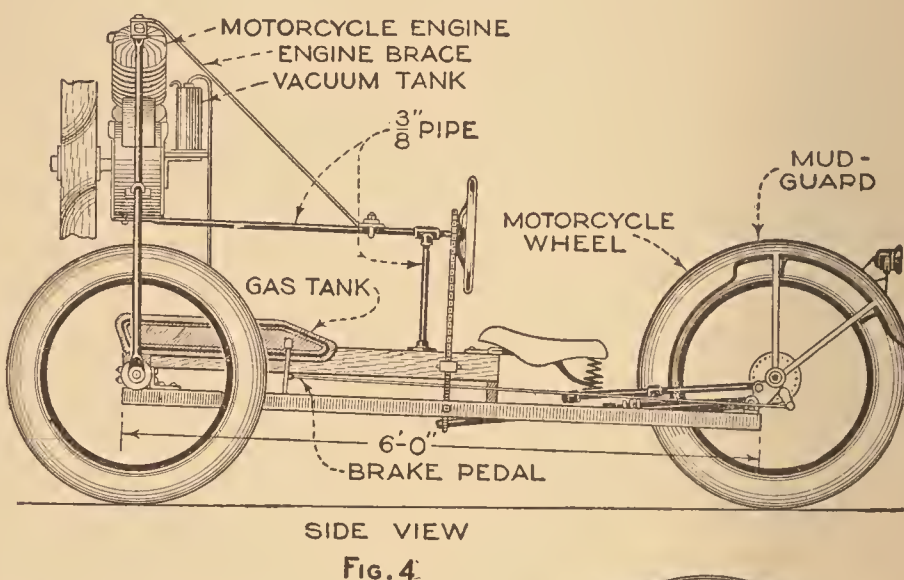
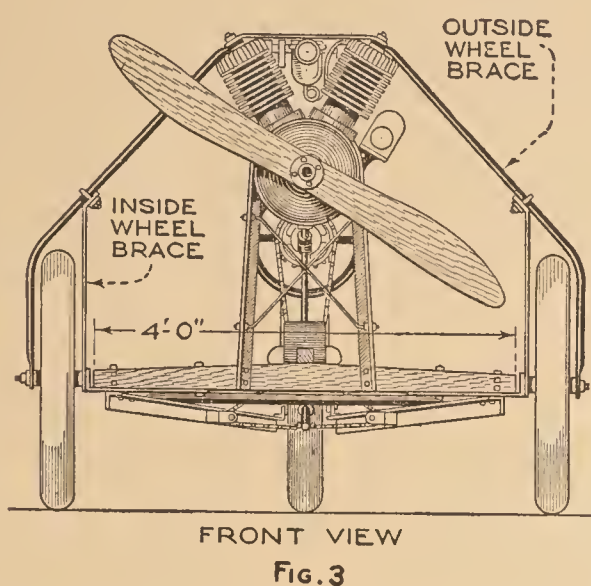
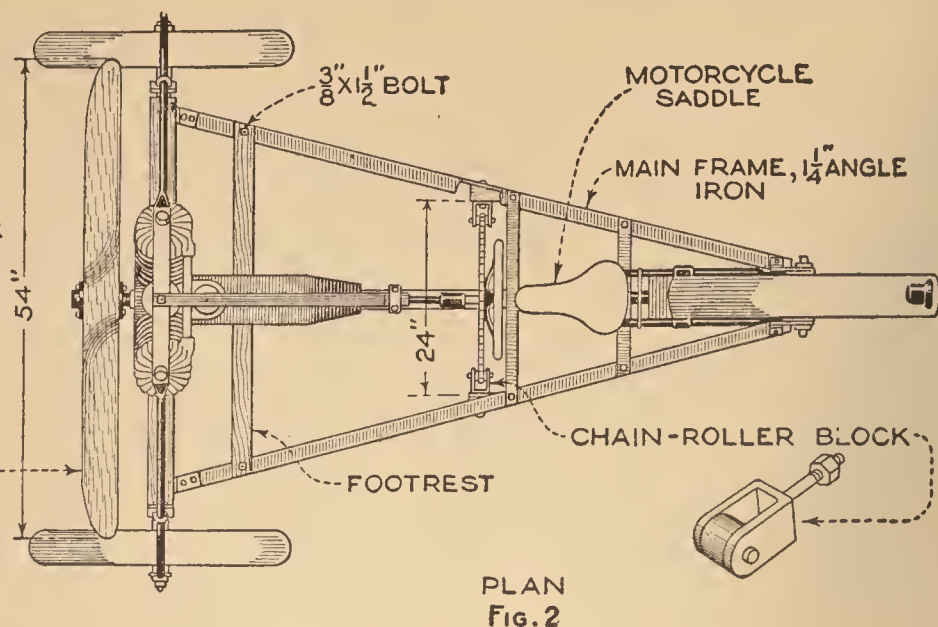
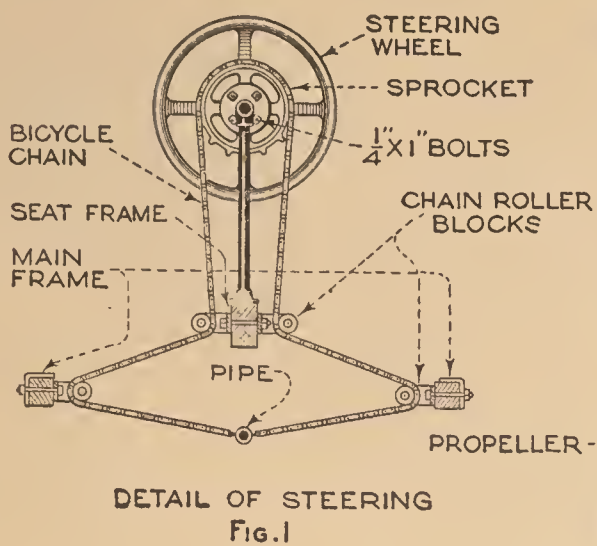
in Fig. 3. The engine is a two-cylinder motorcycle engine; it is braced by a $\frac{3}{8}$ -in. pipe, which also serves as the outside wheel brace, on each side, and by another brace running to the top of the steering pillar, shown in Fig. 5. The inside wheel braces are bolted to the outside braces at one end, and to the wheels at the other end.



Front View of the Completed Wagon: The Propeller Guard has been Removed

The seat frame consists of a 1 $\frac{1}{4}$ by 3-in. board, bolted, at its front end, to the axle, and at its rear, to a 1 by 2 $\frac{1}{2}$ -in. crosspiece bolted to the frame; this is clearly shown in Fig. 5.

A pipe flange is fastened to the top of the seat frame with wood screws; then a short piece of pipe, with a tee on one end, is screwed into it, being tightened until the run of the tee is parallel with the seat frame. A pipe, long enough to reach to the transmission case of the engine, is screwed into the front end of the tee, and the front end fastened to the transmission case by means of a bolt, made in the form of an "L," put through a hole drilled in



Complete Plans and Details of the Wind Wagon: Some Modification of Fig. 8 may be Found Necessary, to Suit the Particular Type of Wheel Employed, and This Also Applies to the Mounting of the Gas Tank Shown in Fig. 5, and to the Fastening of the Seat to the Seat Frame, Fig. 4. The Remaining Details in the Drawing may be Followed Exactly

the end of the pipe, and through one of the holes in the side of the case. A short piece of pipe is screwed into the other side of the tee to serve as a bearing for the steering wheel. When the steering wheel is in place, the proper length of this pipe can be marked, the pipe cut, a thread or two cut on the end, and a pipe nut fitted to hold the steering wheel. A regular automobile steering wheel, with a large bicycle-chain sprocket bolted to it, as shown in Fig. 6, is placed on the bearing, a chain run over the sprocket, through the four roller blocks, a detailed view of which is given in Fig. 2, and the ends attached to $\frac{1}{4}$ -in. hooks in the end of the $\frac{1}{2}$ -in. pipe that replaces the handlebar in the rear fork. The arrangement of the steering mechanism is clearly shown in Fig. 1.

The regular brake in the hub of the rear wheel is connected, by means of a $\frac{1}{4}$ -in. iron rod, to a bicycle pedal, mounted on the seat frame, as shown in Fig. 4. A footrest, made of 1-in. board, is bolted across the frame, in the most convenient position, as shown in Fig. 2, and a motorcycle saddle bolted to the seat frame, as in Fig. 4. A backrest, while

not essential, can be added if desired. An automobile vacuum tank draws the gasoline from a motorcycle fuel tank fastened to the seat frame. This arrangement is shown in Fig. 4, but it may be modified by mounting a small tank directly on the engine, if desired, or if a vacuum tank cannot be obtained. The throttle and spark levers are bolted on the brace that runs from the steering post to the engine, and are connected to the carburetor and timer by $\frac{3}{16}$ -in. wire.

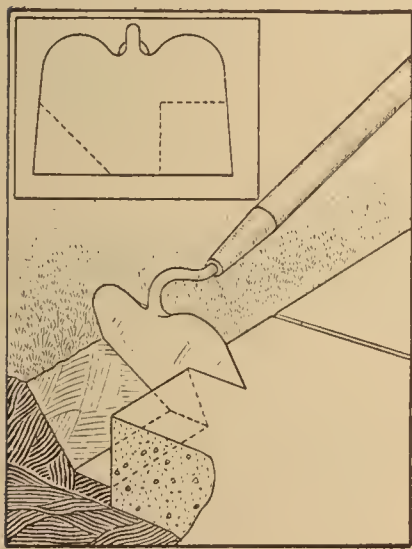
The propeller is $4\frac{1}{2}$ ft. in diameter, with a pitch of 4 ft. It is made of spruce or pine boards glued together, and is 4 by 6 in. in section before carving. It is bolted directly to the crankshaft sprocket, as shown in Fig. 7, a pipe flange being used on the outside of the hub.

A propeller guard, made of wire netting, reinforced by rolling the edges around a steel rod, is mounted on the front, and bolted to the outside wheel braces and to the engine. This is not shown in the drawings, but should not be omitted when building the machine.

The engine is started by turning the propeller in the same manner as an airplane engine is started.

Edging Tool for Lawns

Much time is usually consumed in trimming or edging a lawn or grass plot with the shears, or in digging a neat little trench along the walk, and it is somewhat



disappointing to see how quickly the trench fills up and the edge of the plot becomes ragged again.

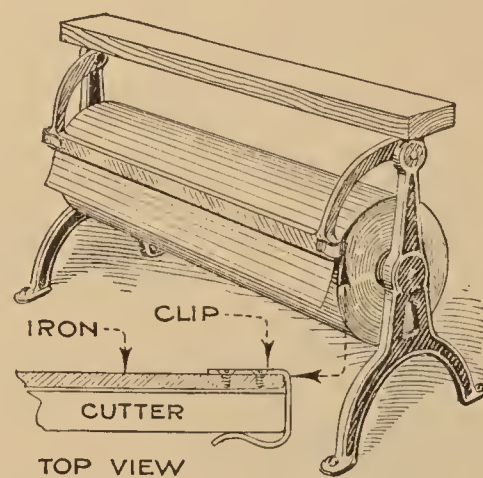
A tool that will form a neat trench when the soil is loose, as when the lawn is first dug and seeded, and will aid in keeping the trench, once formed, clear and

straight, is shown in the illustration. A hoe, which may be an old one, is cut as indicated by the dotted lines. In use, the vertical and horizontal faces of the tool are pressed against the walk as the hoe is pulled along, so that a uniform width and depth are obtained along the trench. The use of this tool once or twice a week will insure that much-desired neat appearance of the lawn edges. —S. E. Gibbs, Corydon, Ia.

Attachment for Paper Holders

A piece of iron with two small clips with which to fasten it over the ends of the cutter of a paper-roll holder, such as

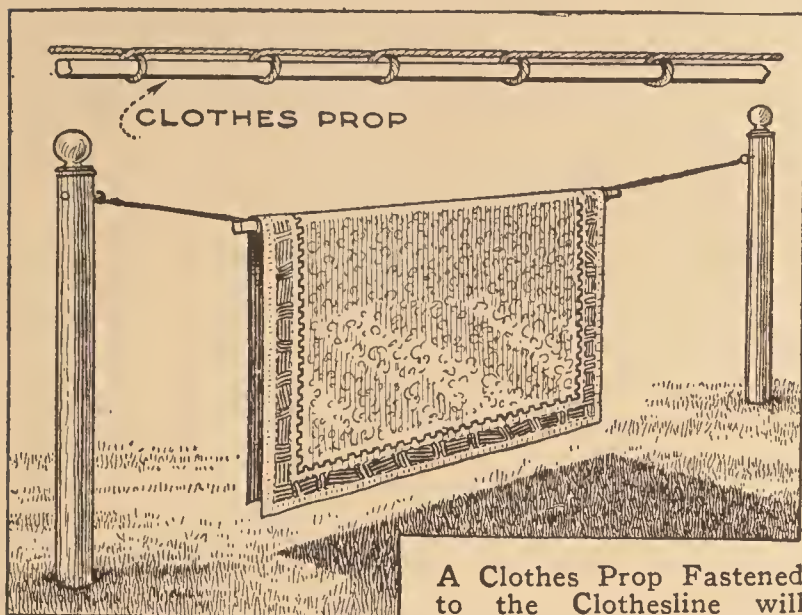
forms a part of the fixtures of every store and shipping room, is an improvement that will be appreciated by wrappers and shipping clerks. A piece of flat iron, the same length of the cutter, has a spring-steel clip fastened to each end, the device being attached to the cutter on the holder, in the manner shown. The end of the roll is passed between the cutter and the attachment, thus keeping the paper from sticking to the roll, and making it easier to get at the end of the roll when a piece is to be torn off.—Vernon Brooks, Pittsburgh, Pennsylvania.



☞ Chamois skin may be cleaned by soaking in soda and water, and then in soap-suds.

Hanging Rugs and Carpets on the Clothesline

No matter what method is used to beat the dust out of a large-size rug or carpet,

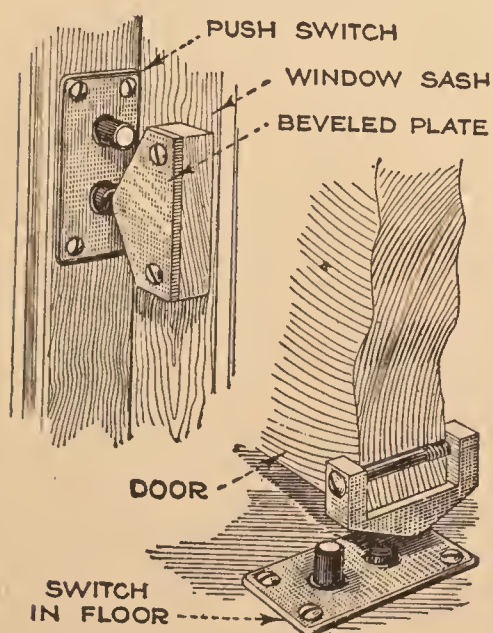


Other Floor Covering from Wrinkling and Sliding Down toward the Middle of the Rope

it is advisable, if not necessary, to hang it on a line, not only to allow the dust and dirt to fall to the ground, but to allow the sun and air to exercise their cleansing action. Regardless of how taut the line is drawn, the carpet or rug will always wrinkle and sag down more or less; this can be prevented by taking one of the clothes props and fastening it to the line by a series of single hitches, in the manner illustrated.—John L. Dougheny, Toledo, Ohio.

Connecting Burglar Alarm to the Lighting Circuit

Burglar alarms for either stores or residences can be advantageously wired in circuit with the electric-lighting circuit



necessary to have all switches and alarm appliances wound for the voltage of the lighting circuit, but the alarm circuit can

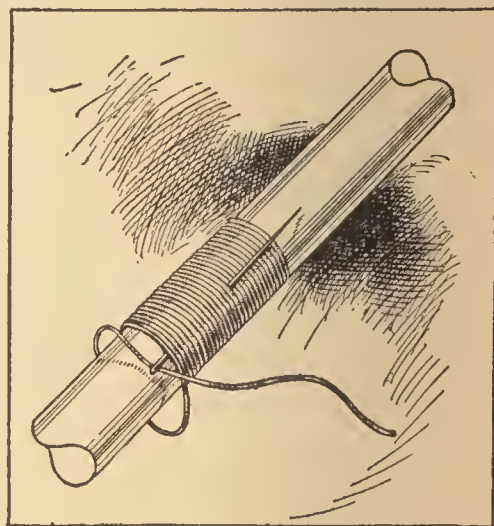
of the place, so that separate batteries can be dispensed with, and while the wires of a battery circuit can be easily detected and cut, a burglar will usually hesitate at cutting 110-volt wire. Of course, by this method it is

be taken through a bell-ringing transformer. The drawing shows how the familiar push-button light switch can be fitted to doors and windows, so that if they are opened the circuit will be closed and an alarm given. In the case of a window, the switch is mounted in the casing and the operating block is fastened to the lower sash. In the case of a door, the switch is arranged at the top or bottom.

Re-Serving a Fishing Rod

A method of re-serving a fishing rod that has some advantages over the usual process is shown in the drawing. A little

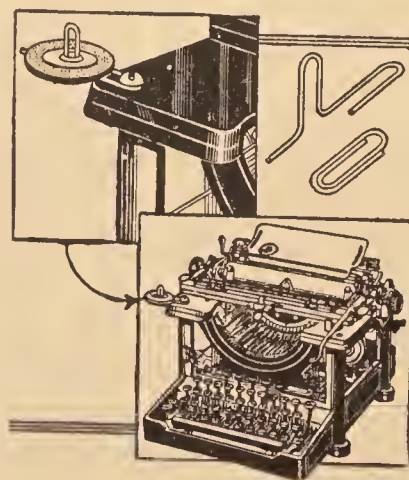
over half of the serving is wound on in the usual manner, the end of the thread being laid along the rod, and the serving wrapped over it. A very fine needle is then laid down on



the rod and the serving continued over it. The other end of the thread is passed through the eye of the needle, and the latter pulled out; a mere touch of vaseline on the needle will cause it to pull through easily; if it sticks, however, it can be grasped in a pair of flat-nosed pliers, and pulled through.—Robt. Page Lincoln, Minneapolis, Minn.

Holder for the Typewriter Eraser

Like many other typists I frequently misplaced my circular typewriter eraser. By the use of a twisted-wire paper clip,



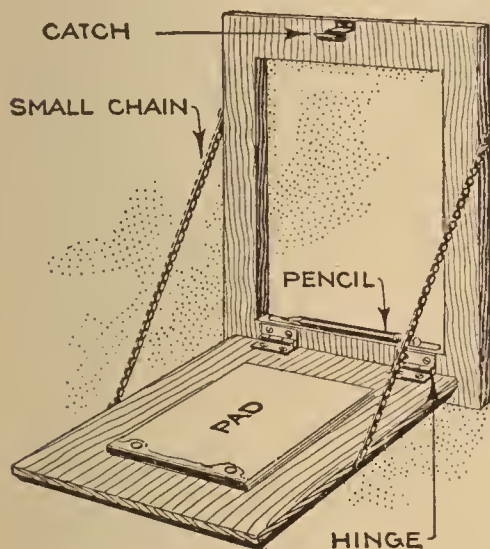
made into a holder, however, the eraser is always at hand. The clip is bent to the shape illustrated and is secured to the machine underneath the head of a convenient screw on the frame of the machine. The perpendicular U-shaped part is squeezed together to make an easy fit through the eyelet in the center of the eraser.—L. H. Unglesby, Baton Rouge, La.

Repairing Leaking Water Tanks

Rust often eats holes through galvanized-iron range boilers used for heating the domestic water supply. Many owners and users of such apparatus do not know that a leak in such a tank or boiler can be stopped without shutting off the water by driving a tapered wooden plug into the hole as a temporary repair. The wood from which the plug is made should be dry; after it is inserted, it will absorb water and swell, so that it will stick tightly. A small hole may be drilled into the thick end of the plug, and a smaller plug driven into this hole, to press the larger plug even more tightly against the edge of the orifice.—James E. Noble, Toronto, Can.

Telephone Pad Holder and Desk

A useful pad holder, of particular convenience when used in connection with a wall-type telephone, is easily made. Two pieces of white pine are used, one a little larger than the other. The center is cut



out of the larger piece so as to leave a margin of about 1½ in. on each side; this is to allow room for the pad and pencil when the holder is closed up. The smaller block is used for the cover

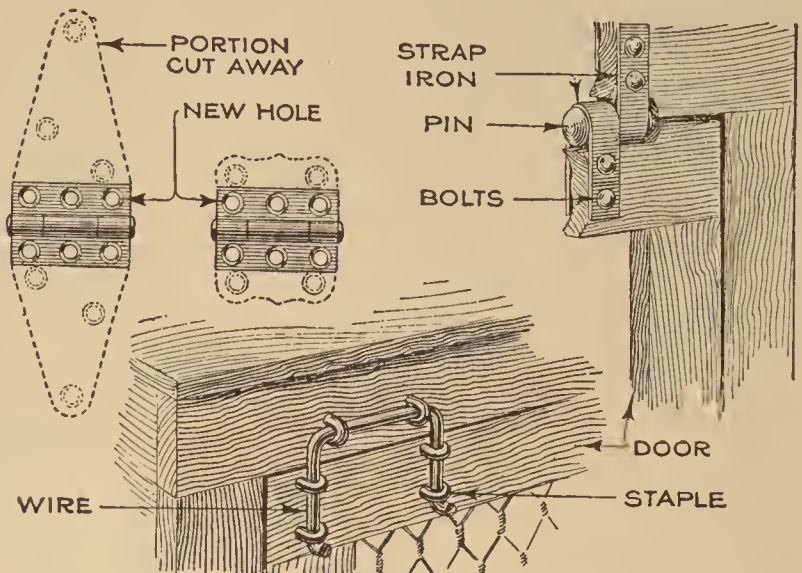
and pad holder, and the edges of this piece are neatly beveled. Two small hinges are used at the bottom of the cover, which is held in the proper position for writing, when opened, by short lengths of chain. A catch at the top keeps the cover in place when the pad is not in use.—C. R. Jones, Chicago, Ill.

Making Small Hinges

Small hinges for various purposes can quite often be made from larger ones by cutting off the superfluous parts, and drilling and countersinking new holes for the screws, as suggested by the examples shown in the upper left-hand corner of the illustration, the dotted lines indicating the parts cut away.

A simple hinge for poultry coops, rab-

bit hutches, and similar uses can be made from a piece of strong wire or iron rod and a few staples. The wire is bent into the shape of a "U," and the ends are bent at right angles, the bottom staples



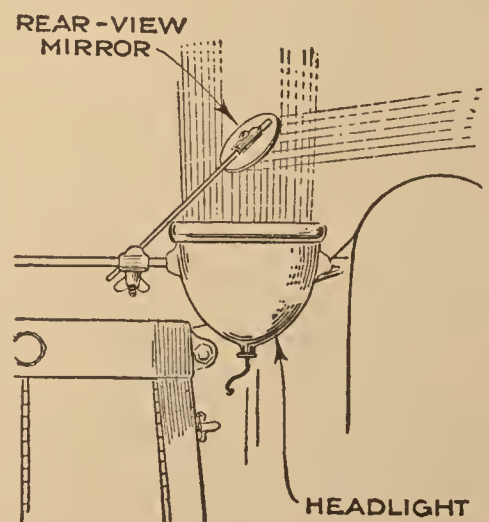
Small Hinges for Cabinet Work, Light Doors, Windows, Poultry Coops, and Rabbit Hutches

on the door resting on the projections thus formed. Staples are used for attaching the hinge to the frame, as shown.

A very strong, though simple hinge of the thief-proof type is made from two U-shaped pieces of flat iron, one of which is fastened to the frame and the other to the door or window on which it is used. A pin of the proper length and diameter is put in place, the grooves for the reception of the pin and hinge ends are cut in the woodwork, and the hinge is fastened with carriage bolts. The nuts of the bolts should, of course, be placed inside.

Aid in Driving on Dark Roads

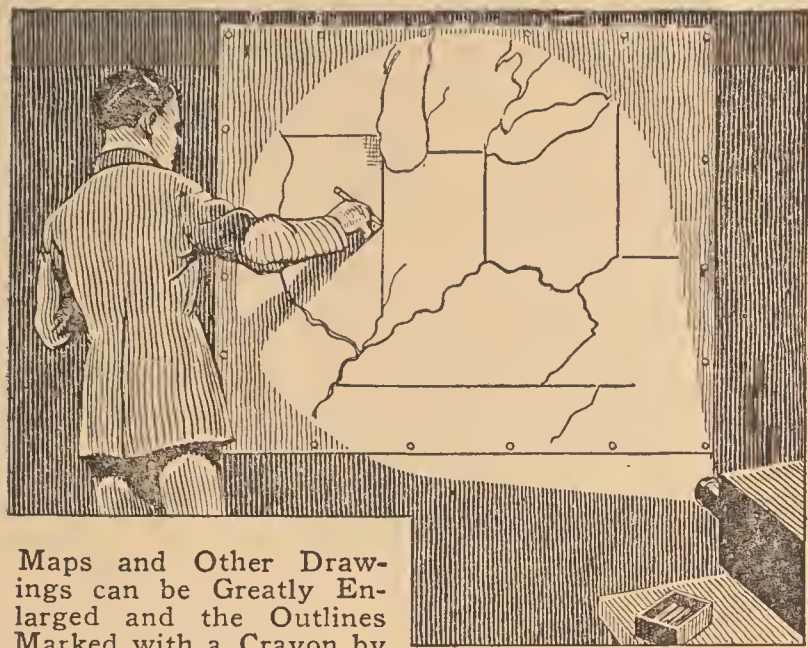
As an aid to the motorist in driving along dark roads, and in preventing the accidents that are a result of crowding too close to the ditch to allow another car to pass, a small mirror mounted in the manner indicated will prove of much value.



A small plane rear-view mirror, such as is obtainable at practically any auto-supply store, is clamped tightly to the headlight brace, in such a manner that part of the light from the right headlight will be reflected at right angles to the car, illuminating the side of the road.

Enlarging Maps and Drawings Quickly

During a recent campaign, it was necessary for a Sunday school to copy, for display on the walls of the headquarters, a

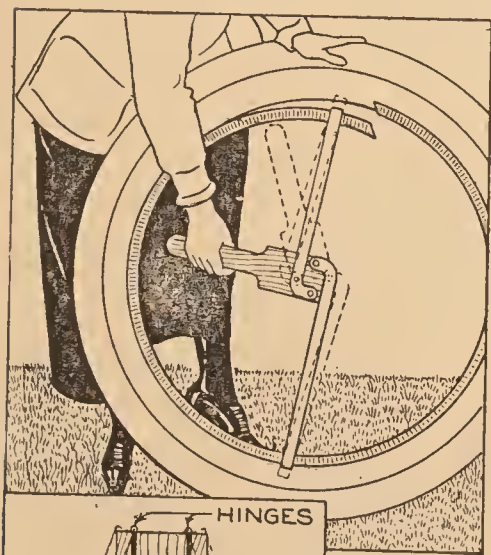


Maps and Other Drawings can be Greatly Enlarged and the Outlines Marked with a Crayon by Projecting an Image of the 'Small Original through the Lens of a Postcard Projector

map of a certain territory. The map was made at a minimum of expense and trouble by projecting the image of a small map through a postcard projector onto a piece of muslin stretched on the wall. The outline of the map and its various divisions were quickly and accurately sketched on the muslin with a crayon.

Remover for Split Rims

An easily made implement for applying and removing tires, which is equally



valuable in the tool box and in the garage, consists, as indicated in the drawing, of but three pieces.

The two arms are made of steel, and are forged with a short hook on the outer ends, to

enter between the rim and bead of the tire. The inner ends are bent at right angles and pivoted, off center, to a wooden lever.

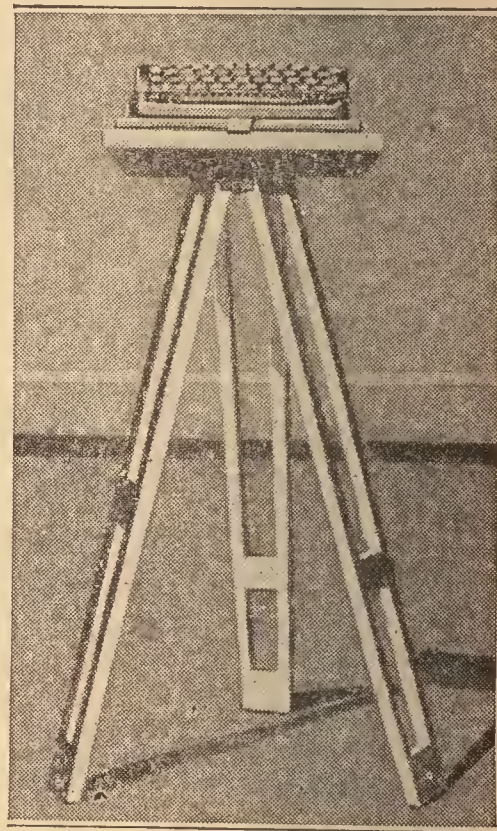
When the handle is raised a little above the horizontal, the device is positively locked. The rim can be expanded by placing the ends against the inside of the rim and operating the lever.

Removing Sickle Sections

To remove worn or broken sickle sections from a mower bar, rest the bar on an anvil, or other solid support, with the broken section vertical and against the side of the anvil. Strike the top of the section two or three heavy blows; this will shear off the rivets without distorting the mower bar.

Portable-Typewriter Stand Made from Camera Tripod

A camera tripod, of the heavy type used by professional photographers, makes an excellent typewriter stand, particularly for the light portable models that are so popular. Cut a board of the size it is desired to make the base, and in its center drill a shallow hole; force into the hole a nut that will fit on the screw in the tripod head. The tripod screw will probably be somewhat longer than the thickness of the nut, so that a smaller hole must be drilled clear through the board to make room for the end of the screw. This board can be fastened to the tripod in the same manner



as the camera, to form a table for the typewriter; the side of the board into which the nut is sunk must be uppermost when in use. In case the legs of the tripod should prove too long for convenient writing, they can be spread out rather far, and prevented from slipping by using three short pieces of light chain extending from one leg to the other.—C. L. Meller, Fargo, N. D.

Rubber Tires for the Wheelbarrow

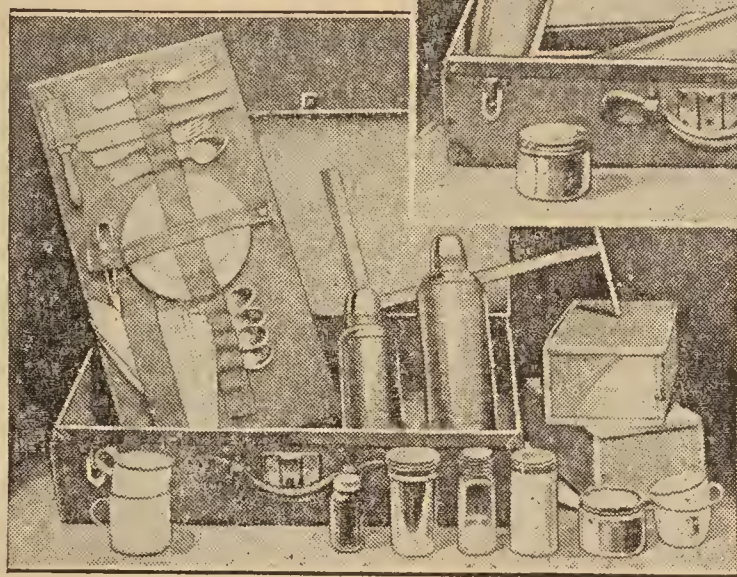
A piece of garden hose will serve as a rubber tire for a wheelbarrow. Split a sufficiently long piece of hose in half, and fasten one of the halves to the rim of the wheel with wires.—J. Stumpf, Mt. McGregor, N. Y.

Suitcase Made into Motor Picnic Kit

A suitcase can be made into a motor picnic kit without in the least preventing it from being used for its intended purpose. A piece of thin, tough wood, or a piece of wallboard, just large enough to fit snugly inside the top, is covered with denim or similar material, and suitable straps and pockets for holding the spoons, forks, plates and similar articles are sewed or tacked on, as shown. Glove

snap fasteners, if they can be obtained, should be used for securing the straps. Strips of light wood are fitted into the body of the case to form compartments

of the proper size for vacuum bottles, food boxes, drinking cups, and other articles, an individual compartment being provided for each. These partition strips are all fastened together, but not to the



suitcase, so that they can be removed as a unit and the several strips prevented from becoming mislaid or lost. In this manner, the "legitimate" use of the suitcase is not interfered with, as everything can be easily removed. Such a lunch kit

is carried just as any other suitcase when on the car, on the running board or trunk rack, due care being taken, of course, to see that the contents of the kit are kept "right side up." By using a

A Motor Picnic Kit in a Suitcase: Places are Provided for Dishes and Food Containers, and Everything can be Easily Removed

suitcase made of vulcanized fiber, and making the partitions and other fittings permanent, an outfit is obtained which is very strong

and practically indestructible. Genuine vulcanized fiber is very tough, and cannot easily be scratched and marred as can the ordinary leather case.—Walter C. Harris, Brooklyn, N. Y.

"Spark Intensifiers"

Much has been said both for and against the so-called "spark intensifiers" as used in connection with automobile spark plugs. Very few can explain the principle upon which they operate, although many know that by their use the ignition of some engines is improved.

Spark intensifiers are designed to cause a carbonized plug to fire in spite of its fouled condition. They contain a gap which is from $\frac{1}{32}$ to $\frac{1}{16}$ in. wide, and are attached to the spark plug in such a way that the spark must jump both the gap in the intensifier and the gap in the spark plug, as these gaps are in series.

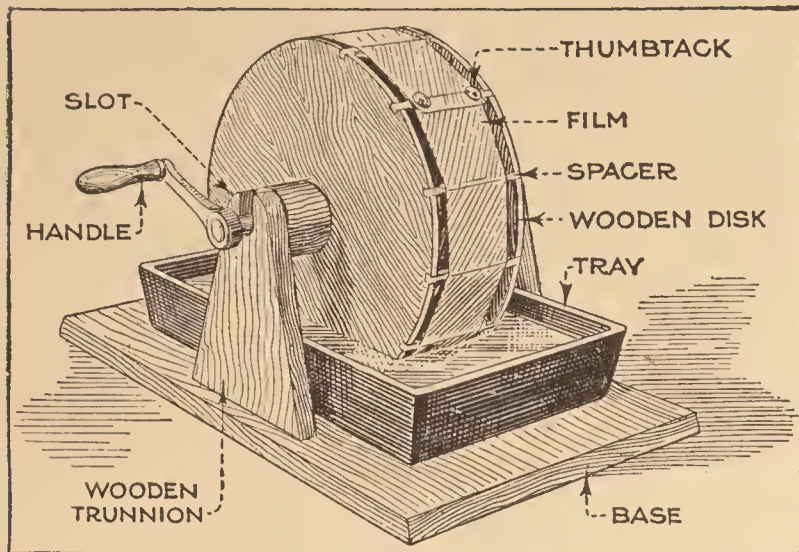
In order to jump the gap in the spark plug a potential of about 5,000 volts is required, but before this value is reached, a carbonized plug begins to let current leak from the coil, which lowers the voltage to such an extent that a pressure of 5,000 volts may not be attained, in which case there is no spark at the plug gap. The action of the

spark in the intensifier, however, stops this preliminary leakage because it disconnects the spark-plug wire from the carbonized plug. The high-tension current is then dammed up until it finally breaks down the gap in the intensifier, and the current comes with such a rush that it cannot all leak through the soot and some must therefore jump the spark gap, thus producing a spark at a plug that would not otherwise fire.

In experiments made with the intensifier it has been found that, with oil-pumping engines, they may be used to advantage, but no benefit can be said to be derived from their use on an engine free from spark-plug trouble. Furthermore, there is a possibility that their continual use may result in harm; for example, if the gap is widened either by becoming jarred out of adjustment or burning away, the voltage may build up to a point where injury to the coil insulation would result. This, of course, could only occur to coils that are not provided with safety spark gaps.

Reel for Developing Roll Films

For the amateur photographer who has only an occasional roll of film to develop and who dislikes the tiresome ordinary

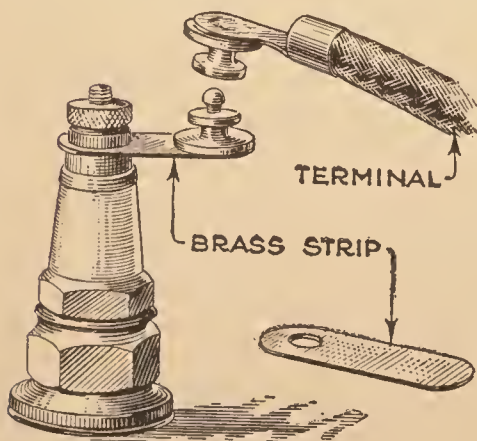


Developing Roll Films by Attaching Them to an Easily Made Drum, Which is Revolved in a Tray of Developing Solution Placed Underneath

method of dipping the strip from side to side, the developing device illustrated is particularly intended. The device consists of a wooden cylinder that is mounted on suitable supports and revolved by a crank. The drum is made of two wooden disks, of the proper diameter, which are held the right distance apart by short strips of wood; these also form a support for the film, which is attached to one of the cross-pieces with thumbtacks. The drum is mounted so that it can be revolved in a tray of developer placed underneath. In developing a film by this method, the dull or sensitized side, should be uppermost. The paper backing should be removed from the film, as in developing by hand, and the wheel should be turned slowly.

Novel Spark-Plug Terminals

A pair of snap cuff links can be used to make a spark-plug terminal that may be disconnected instantly. The halves of the links are separated, and one part is soldered to the terminal of the ignition cable.

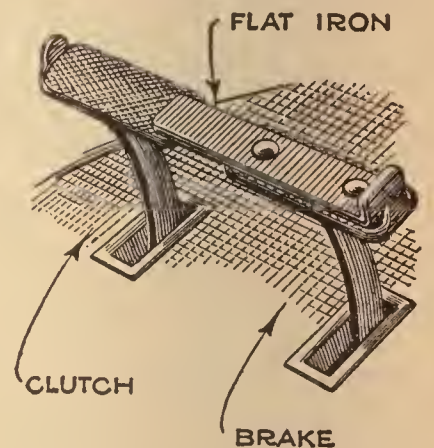


Then a small strip of stiff brass, about 2 in. long and $\frac{3}{4}$ in. wide, is cut, and a $\frac{3}{16}$ -in. hole drilled in one end. The other half of the cuff link is soldered to the opposite end of the strip. Slip the hole

over the brass spark-plug screw, screw down the nut, and the connection is complete when the button on the cable is snapped in place. By lightly twisting the blade of a screwdriver between the halves of the links, the connection can be instantly separated.

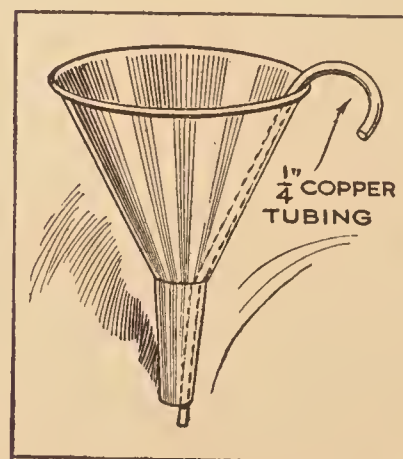
Driving Auto with One Foot

A stonemason had one of his feet so badly injured by a stone falling on it that he was unable to drive his car, until the pedals had been arranged as in the drawing, so that but one foot was needed to control the clutch and brakes. A piece of flat iron, long enough to extend across to the clutch pedal, was bolted to the brake pedal. With this arrangement the clutch is automatically disengaged as soon as the pressure is applied to the brake pedal, but the clutch may still be disengaged without applying the brake. It may be found necessary, in some cases, to make an offset in the iron strip, between the two pedals, owing to differences in the length of travel of the two pedals.—H. C. Rowell, Hudson, N. H.



Funnel Prevents Air Binding

When liquids are poured into a vessel through a funnel the fluid displaces the air in the vessel and compresses it, so that



it must find an outlet before more of the fluid can enter; this is the cause of bubbling in the funnel, which sometimes causes more or less of a mess. The trouble can be overcome by soldering a piece of $\frac{1}{4}$ -in. copper tubing inside the funnel so that the ends of the tubing extend beyond the spout and edge, the end projecting above the edge being bent over to form a handle. This arrangement allows the confined air to escape through the tubing and lets the liquid flow into the vessel in a steady stream.—John H. Schalek, Pittsburgh, Pa.



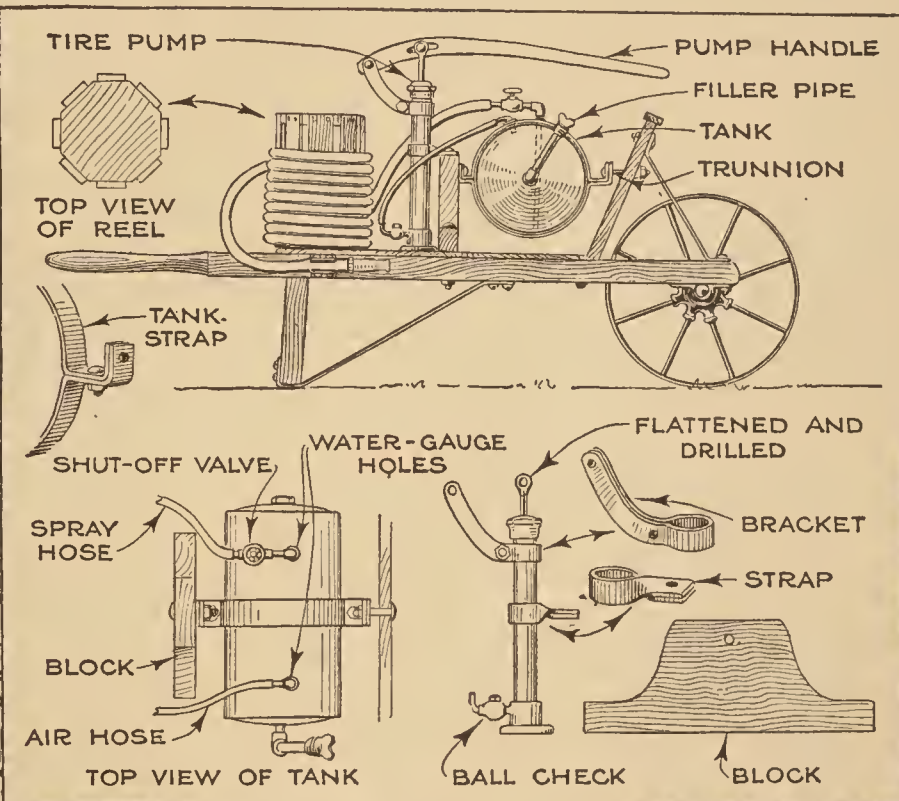
A Wheelbarrow Spraying Outfit

By L. B. ROBBINS

A COMPACT and serviceable spraying outfit for use in the small orchard can be made for a few dollars. It is mounted on an ordinary wheelbarrow, so that it can be wheeled to any location, ready for work.

The most important part of the apparatus is the tank, which is made from a hot-water heating - system expansion tank. A tank with a capacity of about 20 gal. can be obtained from

pump to the tank. A piece of pipe, long enough to reach almost to the bottom of the tank, is threaded for its entire length, screwed into the other gauge hole, locked with a pipe nut, under which a soft-rubber gasket and a washer are placed, and an elbow, two short nipples, and a shut-



A Compromise between the Extremes of Heavy and Expensive Spraying Equipment and the Light Knapsack Outfits is Struck by This Homemade Apparatus. It is Mounted on a Wheelbarrow, So That It may be Transported Easily Wherever It is Needed

off valve are screwed on for the spray-hose connections. The pipe opening in one end of the tank is plugged, and the one in the other end fitted with a filler pipe, kept closed by an ordinary pipe cap, to which a sheet-metal wing is soldered for ease in opening and closing. A leather or rubber disk should be placed inside the

hardware dealers or plumbing contractors; it comes equipped with a water gauge and fittings, which, as they are unnecessary for the spraying outfit, are removed and discarded. After the gauge glass and fittings are removed, an elbow and two short nipples are screwed into one of the holes, for use in connecting the

filler-pipe cap to prevent the air inside the tank from leaking.

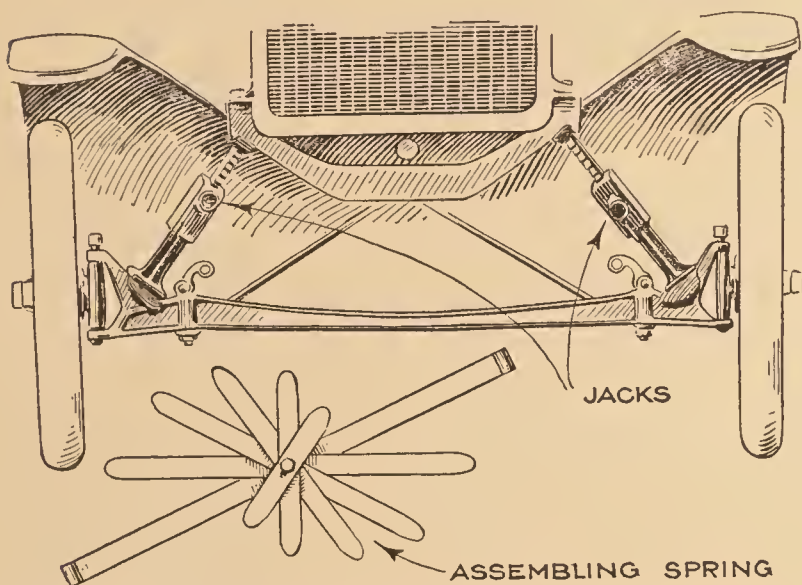
A two-piece clamp is made of flat iron, and bolted around the middle of the tank so that the latter will balance when mounted on the trunnions, which are ordinary bolts. This arrangement makes it possible to keep the spray mixture agitated by rocking the tank, so that the ingredients do not settle to the bottom. A wooden block, bolted to the bed of the wheelbarrow, serves as a support for one of the trunnions, while the end of the barrow carries the other. An automobile-tire pump, preferably a three-stage one, is bolted to the floor of the barrow; the end of the plunger rod is either flattened

or fitted with a yoke, so that it can be attached to the curved pump handle, which is made of either wood or iron. The pump handle is fastened to the cylinder by a curved bracket that clamps around the barrel just underneath the cap. A ball-check valve must be provided between the pump and tank.

A hose reel, similar to the one shown, may be fastened to the unoccupied space on the floor of the wheelbarrow, to carry the necessary hose, or the hose may be coiled inside of a box fastened to the bed. Bolts should be used to fasten all of the apparatus to the wheelbarrow, so that when the sprayer is not in use, the tank, pump, and fittings may be removed.

Assembling and Replacing Springs

One of the frequent troubles experienced with the light automobile is breakage of the front-spring leaves. The draw-



Methods of Elevating the Front of a Light Automobile for Removing or Replacing a Front Spring, and of Assembling the Leaves without Clamping

ing illustrates methods that facilitate the replacing or removal of a broken leaf, and the assembly of the leaves without clamping. The leaves are assembled star-fashion, as shown, about the center bolt. The nut is easily screwed on a thread or two, after which the leaves are brought into their proper position and the nut tightened.

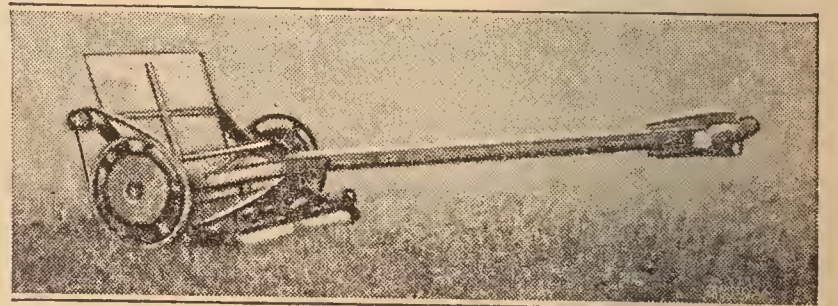
In lifting the car frame above the axle, to remove or replace a spring, two jacks are placed, one on either side, with their bases resting against the axles, their heads resting under the lamp brackets on each side. The wheels are blocked so that they cannot rock. This affords a quick method of lifting, and one that gives a clear working space. In cases where the center bolt of the spring does not aline with the slot in the frame, by simply raising one jack and lowering the other, the body will shift

enough to make them line up. The same method can be applied to lifting the rear of the car above the rear axle, although the lift will necessarily be greater on account of the considerably greater deflection of the rear spring.—G. A. Luers, Washington, D. C.

Mower Attachment for Cutting High Grass

After the lawn has been neglected and allowed to grow for more than a week, it is generally hard work to make a good job of mowing, as great exertion is required to push the mower into the tall growth.

The photograph indicates a way out of the difficulty. It consists in attaching to the mower a revolving blade, or fan, which pushes the tall grass into the cutter so that it can be cut off instead of being pushed over by the advancing lawn mower and rolled flat on the ground. Two pieces of flat-iron stock are drilled at one end to take a light shaft, and the opposite ends are drilled to fit under nuts on the mower-wheel housing. A piece



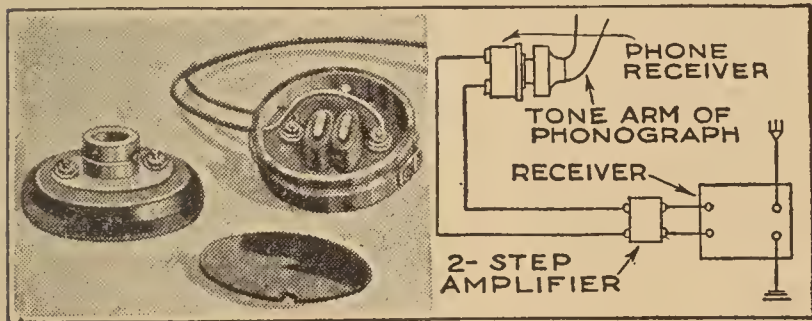
An Attachment for the Lawn Mower Which Makes It Possible to Mow Grass of Tall Growth Easily

of stiff sheet metal, or light board, is mounted on the shaft between the bearings, one outer end of the shaft being provided with a small pulley in line with the mower wheel. A belt around the

wheel of the mower and the pulley causes the fan to revolve when the implement is pushed forward, the grass being pushed into the path of the revolving cutters.—Maurice Staller, Fowler, Ind.

Radio Sound Amplifier Made from the Phonograph

Every night thousands of radio enthusiasts are receiving the musical programs that are broadcast at certain hours. When dependent on ordinary phone receivers the size of the audience is limited to the number of headsets available. However, without spending much money, an ordinary phonograph can be used to amplify the sounds so that all within hearing can enjoy the program. An old phonograph reproducer, or sound box, of a type suited to the phonograph used, is procured, and its back is cut off and fastened to the cap of a telephone receiver, using a piece of felt between the metal and cap. It can then be slipped onto the tone arm of the instrument in place of the regular reproducer. This arrangement in no way interferes with the use of the phonograph for its regu-



The Back of an Old Phonograph Reproducer Fastened to the Cap of a Telephone Receiver, and Slipped onto the Tone Arm of a Phonograph, Makes an Excellent Amplifier for Entertaining an Audience

lar purpose, as it is only necessary to remove the telephone receiver and replace the reproducer, which, in most types of instruments, is simply a matter of a twist of the wrist.—Edward Thomas Jones, New Orleans, La.

Clothespins Replace Rake Teeth

About half of the original wooden teeth of a lawn rake were broken, and as a result the rake was practically useless for any purpose until the missing teeth were replaced.

Clothespins were used for the purpose, and in order that all the teeth would be uniform, the old teeth were first removed. The clothespins were fitted for their new duty by dressing the heads down to fit the holes in the bar.—Gregor H. Glitzke, Kansas City, Mo.

Hair Drier Made from Electric Toaster and Vacuum Cleaner

A simple but effective apparatus for drying the hair with a blast of warm air,



Drying the Hair by Means of Heated Air Furnished by an Electric Toaster and an Electrically Operated Vacuum Cleaner

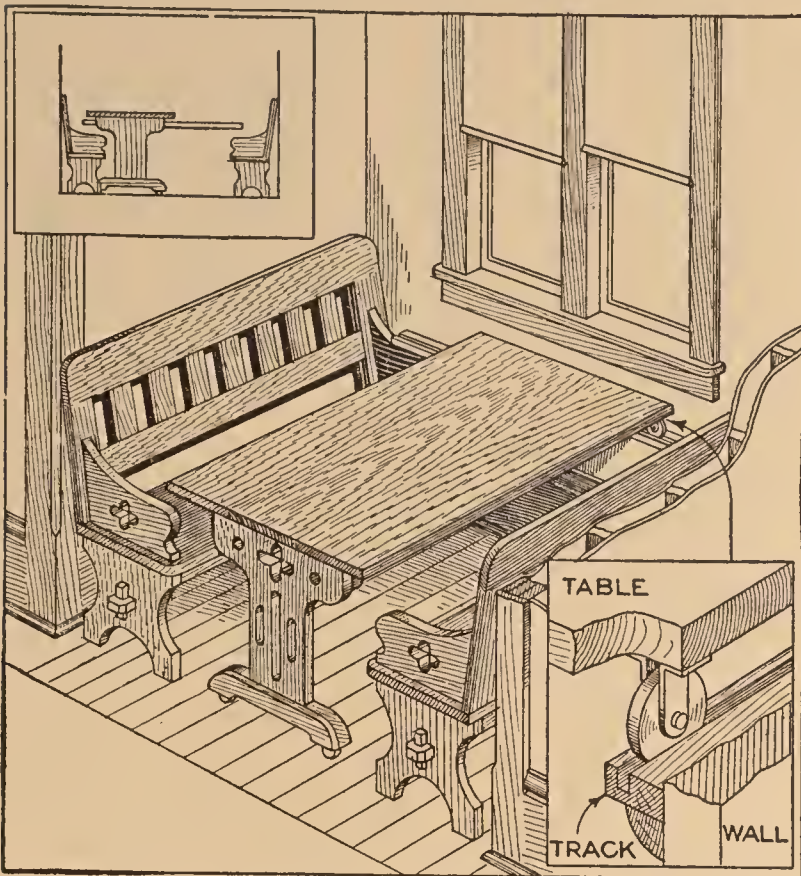
or for other purposes where a supply of heated air may be required, is easily made from an electric toaster and a vacuum cleaner. A wooden box, large enough to contain the toaster, is lined with sheet asbestos, sodium silicate (water glass) being used to paste the asbestos paper to the wood. Openings are cut through opposite ends of the box and metal tubes inserted, over which the air tubes are fastened with light twine. The short air tube, or hose, can be made by sewing together the edges of a strip of closely woven cloth to form a pipe; the longer one is usually supplied with the cleaner. Another piece of tubing, which may be cardboard, is used at the outlet end.

The vacuum cleaner is placed on a sheet of clean cardboard, the nozzle elevated on one or two strips of wood, and the dust bag is removed, so that one end of the short tube can be slipped over the dust-bag nozzle and fastened. The toaster is placed inside the box, the box closed, and the current turned on; when the toaster is well heated, the vacuum-cleaner motor is started. The air entering through the vacuum cleaner is carried through the heated chamber and is delivered through the outlet tube on the opposite side.—H. A. Strickler, Buffalo, N. Y.

Our Bureau of Information will answer all inquiries on radio-instrument construction and operation.

Improved Breakfast-Nook Table

A serious objection to built-in dining or breakfast alcoves is that it is generally necessary for the diners to slide or



Supporting One End of the Breakfast-Nook Table on Wheels, That Travel in a Track Fastened to the Wall, Makes It Easy for the Users to Seat Themselves

squeeze into the limited space between the table and the benches. This objection, in one instance, was successfully overcome in the manner shown in the drawing. The end of the table next the wall was supported on small wheels, running on a grooved track attached to the wall. Set up in this manner, the table is pushed to one side until the occupants of one of the seats are in place, when the table is pulled back so that others can be seated on the opposite bench. A table made in this manner will require only one pedestal, which, of course, is fitted with casters.—J. H. Kay, Cleveland, Ohio.

Dark Box for Photographers

The amateur photographer frequently finds it necessary to leave the dark room during the process of developing a film or plate, and is then compelled to improvise some sort of light-proof covering for his trays to prevent spoiling of the work. After frequent experiences of this kind, one amateur made a simple cover box, which also serves as a receptacle for storing his apparatus when not in use. A heavy cardboard box, large enough to cover the three trays, was used, a 2-in. strip of red cloth being glued around the edge to form a curtain, and a strap handle attached to the top for convenient lifting.

When it is necessary to open the door of the dark room, the box is placed over the trays, any irregularities on the top of the table or edge of the box being taken care of by the red-cloth curtain, which filters any chance rays of light.

Replacing Worn Spring Bushings

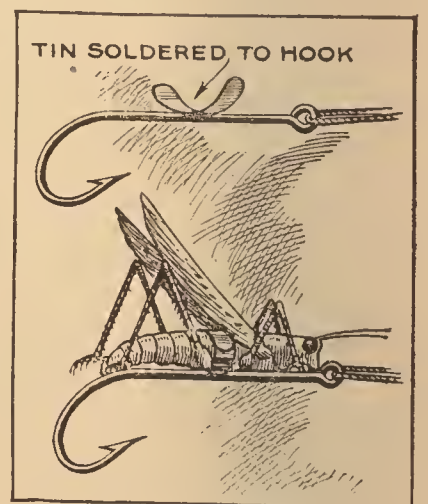
It is sometimes difficult for the amateur mechanic to change the bushings in automobile springs, owing to the fact that the bushing are thin on one side, if not completely worn through. It is also found that the new bushings contract when forced in, making it necessary to ream them out before the shackle bolt will fit.

An easy way to replace the worn bushing with a new one is to remove the old shackle bolt, slip the new bushing over it, and then drive the bolt back into its proper place in the spring eye. This forces the old bushing out and at the same time prevents the new bushing from contracting or from having its end battered. This will probably spoil the old bolt, but that is generally of little consequence. Even when a new bolt must be used, the time and labor saved would be worth the cost. A heavy hammer, or block of wood, should be held against the opposite side of the spring while driving in the bushing. If a heavy arbor press is available, this, of course, should be used to press the bushing into place.—Philip Jonker, Peekskill, N. Y.

Novel Attachment for Fishhook

When fishing with flies or grasshoppers for bait, I tried out the idea of fastening the insect to the shank of the hook with a strip of adhesive plaster.

This plan worked well, but, owing to the moisture, the tape soon loosened, and the improvement shown in the drawing was then made. A small strip of thin sheet metal was soldered to the shank of the hook in



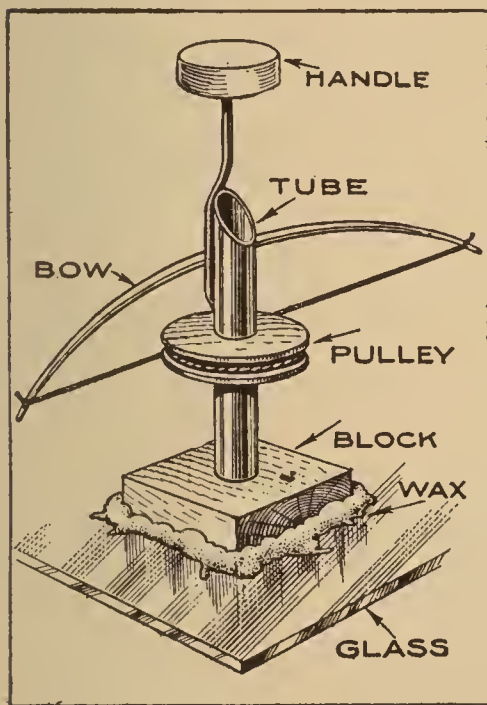
such a manner that, by bending the ends around the body of the insect, the latter was held in a lifelike position, floating on the surface of the water, with the barb of the hook underneath.—G. E. Hendrickson, Argyle, Wis.

Spigot for the Oilcan

Many automobile owners buy their oil in 5-gal. cans, and to pour the contents is inconvenient and generally wasteful, due to the weight of the can when full and to the fact that the oil comes out in spurts. A spigot soldered to the *top* of the can will provide a convenient and wasteless method of pouring. As the screw caps on these cans are very nearly uniform in size, the spigot can be soldered to one of the caps.—R. H. Kasper, Philadelphia, Pa.

Drilling Large Holes in Glass

To drill comparatively large holes in glass, without the danger of breaking it, the arrangement illustrated may be used, and will produce a clean, smooth hole.



A piece of thin brass or copper tubing, the outside diameter of which is the same as that of the hole to be drilled, is fitted with a wire handle and a small wooden pulley. A wood block with a hole in the

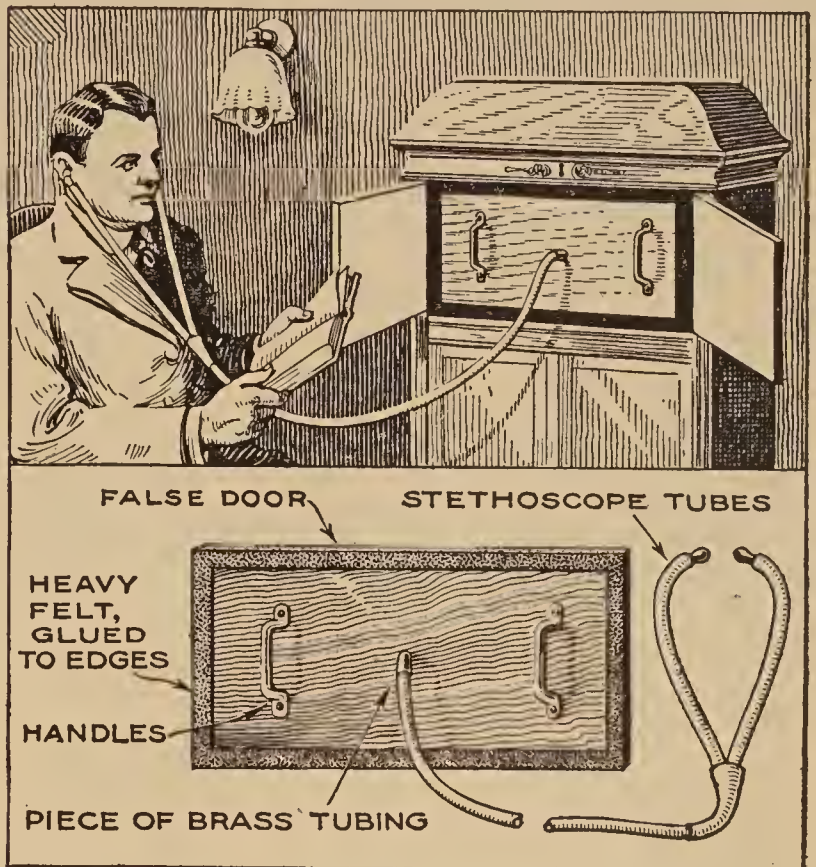
center to fit the tubing used, is provided, and is fastened to the glass by running melted beeswax around the edges. The tube is placed in the hole in the block, partly filled with a mixture of emery and water, and rotated by means of a bow, in the manner of a fiddle-bow drill, the string passing around the pulley. This method is particularly suitable for drilling holes in curved glass, as the underside of the block can be shaped to the curvature of the surface, so that the drill will not slip.

Language Study on the Phonograph

The student of foreign languages by the phonograph method usually makes a nuisance of himself to other members of the family when the instrument grinds out the grammatical construction, and other information concerning the language.

The drawing shows how one student

kept the lessons all to himself by closing the front of the phonograph cabinet and carrying the sound to his ears by means of part of a stethoscope and a rubber tube. The board is edged with felt and



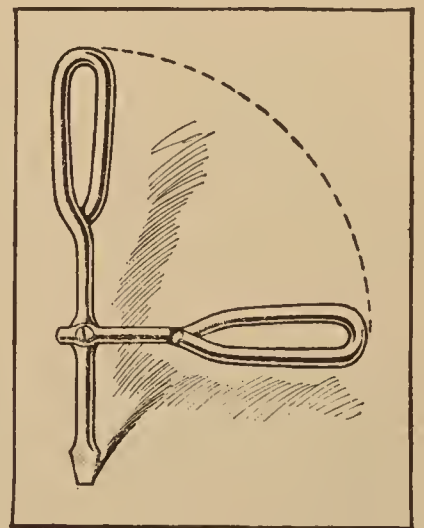
Studying Foreign Languages by the Phonograph Method, a Student Uses the Device Illustrated to Prevent Disturbing the Other Members of the Household

fits tightly into the opening when the sound-chamber doors are opened. A piece of brass tubing, screwed into the center of the board, is used as a connection for the stethoscope ear tubes. The board is fitted with handles, so that it is easily put into place or removed.

Screwdriver Has Extra Leverage

A screwdriver, provided with an extra handle to be used as a lever when an obstinate screw is encountered, may be made of $\frac{5}{16}$ -in. rod.

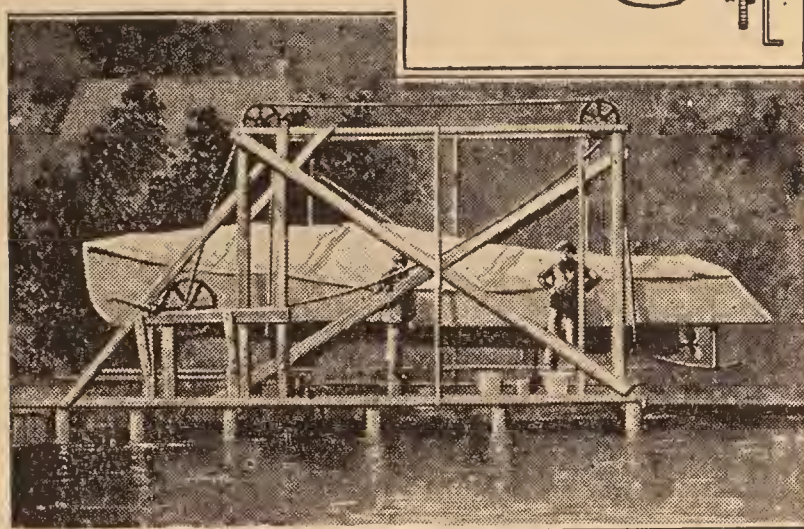
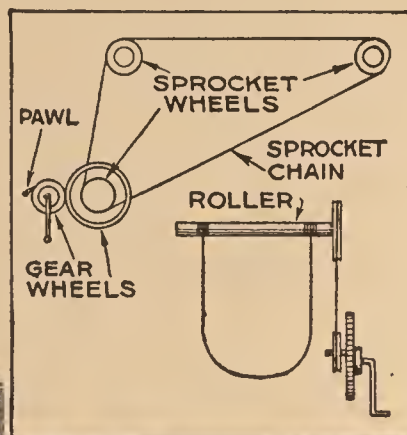
The two handles are formed alike, and the screwdriver bit is forged on the end of one. Both are then flattened slightly at the center, the end of the extra handle cut off, and the handles drilled and connected by a small screw or rivet. Normally, the two handles are parallel, but for driving screws into hard-



wood, or starting a tight screw, the short handle is brought down as shown and used as a lever.

A Simple Boat Hoist

A very efficient and inexpensive apparatus for moving motorboats and similar craft out of the water for winter storage or repairs is illustrated in the photograph. Four 4 by 4-in. uprights, securely braced by 2 by 4-in. material, are erected at a point where the depth of water



Motorboats and Similar Craft are Easily Lifted from the Water for Storage or Repairs by Means of a Simple and Inexpensive Hoisting Device

is sufficient to float the boat to be lifted. The uprights support 4 by 4-in. cross-pieces. The distance between the uprights, as well as their height, will, of course, depend entirely upon the beam of the craft and the elevation to which it is to be hoisted.

The lifting mechanism is quite simple, and consists of three sprocket wheels of the same diameter, operated by an endless chain, to which power is applied by means of a crank, driving a gear and pinion. The gear and one of the sprockets are mounted together on the same shaft, while a pawl, or "click," is provided to engage with the teeth of the pinion to hold the boat at any desired height. Extending from one side to the other of the framework are two rollers, about 3 in. in diameter, with a sprocket wheel rigidly secured to each. Bearings for the rollers are fastened to horizontal crosspieces. Chain slings, with ropes attached to the ends, are passed around the boat hull at stem and stern, the hull being protected from injury by covering the chains with old rubber hose.

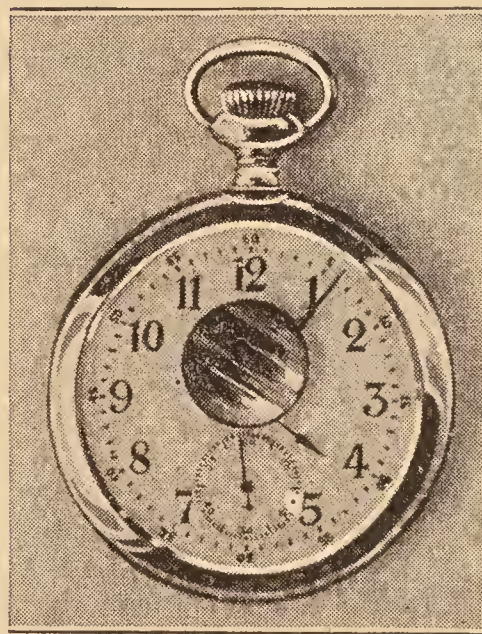
By reference to the diagram it will be apparent that this arrangement provides a very powerful hoisting apparatus, requiring but a small amount of power.—C. L. Meller, Fargo, N. D.

Writing on Glass

Names and designs can be etched on glass without the wax ground or hydro-fluoric acid generally required, by a simple method, which makes it possible to write directly on the glass with a rubber point or even a quill pen. Two solutions are mixed in separate bottles, and equal parts of each are mixed as required. The first consists of 35 gr. of sodium fluoride and 7 gr. potassium sulphate in 1 oz. of distilled water; the second solution is made by mixing 15 gr. of zinc chloride, 65 drops of hydrochloric acid, and 1 oz. of distilled water. Only enough should be mixed for immediate use, and the glass must be perfectly clean and dry.

A Watch-Crystal Mirror

There is a little unused space on most watch crystals that can be utilized to make a small mirror. Cut a piece of pure tinfoil, not too thin, to the size and shape desired, and clean the surface of the foil and the glass with ammonia. Amalgamate the clean surface of the foil by rubbing a drop of mercury over it with the finger. This done, take the foil in a pair of tweezers, and dip it into some clean



mercury so that some of the latter will adhere to the surface. The piece is then placed on the glass with the amalgamated side next to the crystal. Care must be taken to eliminate all air bubbles between the tin-foil and glass,

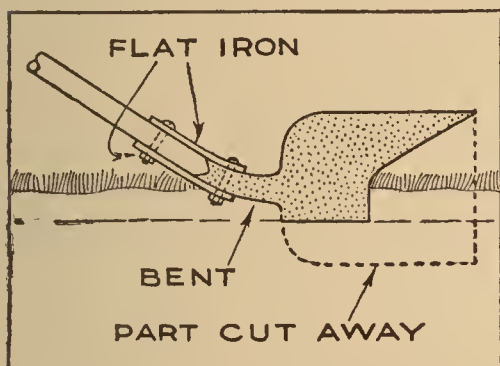
and this is best done by putting the piece of foil to one side of its final location, and sliding it into place with the finger. The amalgamated tinfoil must be kept under pressure against the glass for about 18 hours; this is best done by clamping foil and crystal between felt pads. Care must be used to prevent any of the mercury from coming into contact with the watch-case or movement. Most watch crystals being curved, such a mirror will be convex and will reflect a reduced image of practically the whole head, making it useful for combing the hair or adjusting a tie.—Walter E. Burton, Kenmore, Ohio.

Stencil-Color Pails for Painters

When using different colors of paint in ceiling work, such as in stenciling and painting designs, I have found it quite a help to use several cans containing the separate colors and fasten them onto a cord or belt. Holes or slots are cut near the top of quart cans through which the cord or belt is inserted. About an inch of color is placed in the cans. In use, the belt or cord to which the cans are attached is worn around the painter's waist. This arrangement does away with the constant bending and stooping to the floor or scaffold.—C. O. Soots, North Salem, Ind.

Lawn Edger Made from Shovel

One way to make a lawn trimmer or edger is to use the remains of an old shovel or spade in the manner suggested



by the drawing. From the front corner of the shovel blade draw a straight line diagonally toward the shank. When about two-thirds of the

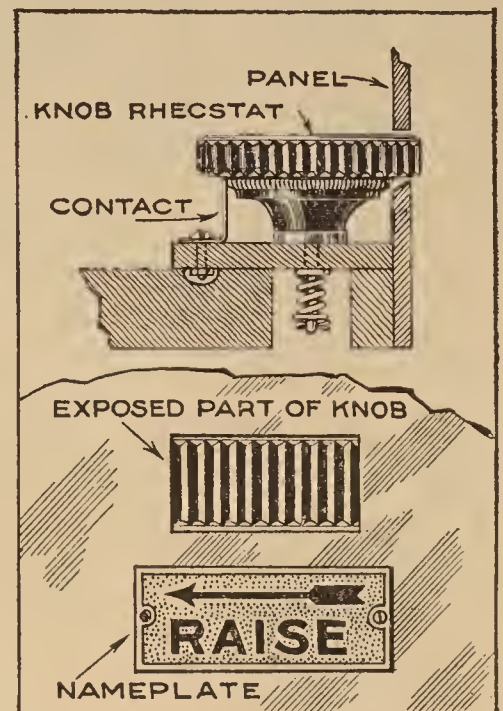
distance from the edge to the shank, turn the line downward, and, when an inch or two below the shank, turn again at right angles, as shown. Then cut along this line with a cold chisel and smooth the rough edge on a grinding wheel, sharpening it at the same time; a file will answer the same purpose. Finally, heat the shank a cherry red, bend upward, and insert a long handle, reinforcing it with two pieces of flat iron on the top and bottom. The edger is pushed along in the position shown.

Lining a Hanging Basket

If even a little of the moss lining of a hanging basket falls away, a hole will soon form that will permit the earth to wash out when the plants are watered. This trouble should be prevented when the basket is made up. After the moss lining has been put in place, a circular piece of burlap, or similar material, is laid inside against the moss, before the basket is filled with earth. The burlap lining holds the earth, even should the moss become loose or punctured.

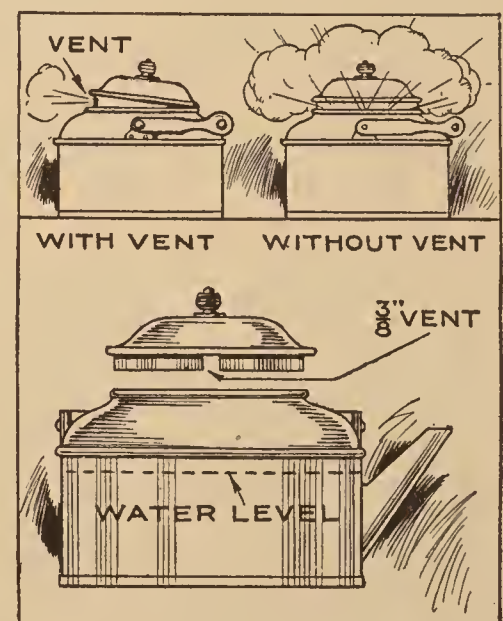
Novel Radio-Rheostat Mounting

When making a radio set that was intended to be as compact as possible, it was discovered that it was out of the question to mount the panel-type rheostat in the usual manner. The difficulty was overcome by using a rheostat in which the resistance wire is molded into the knob and mounting it horizontally instead of vertically. A slot was cut in the panel, through which the rheostat knob projected about $\frac{1}{16}$ in. Thus the knob could easily be revolved with the thumb or forefinger to any desired adjustment.—Leon D. Quick, Milesburg, Pa.



Safety Vent for the Teakettle

When the teakettle is filled with water above the inner opening of the spout, the cover will vibrate when the water begins to boil, making considerable noise, besides which one may easily scald his hands by the escaping steam. This undesirable feature can be overcome by cutting a slot, about $\frac{3}{8}$ in. wide, in the flange of the cover. The

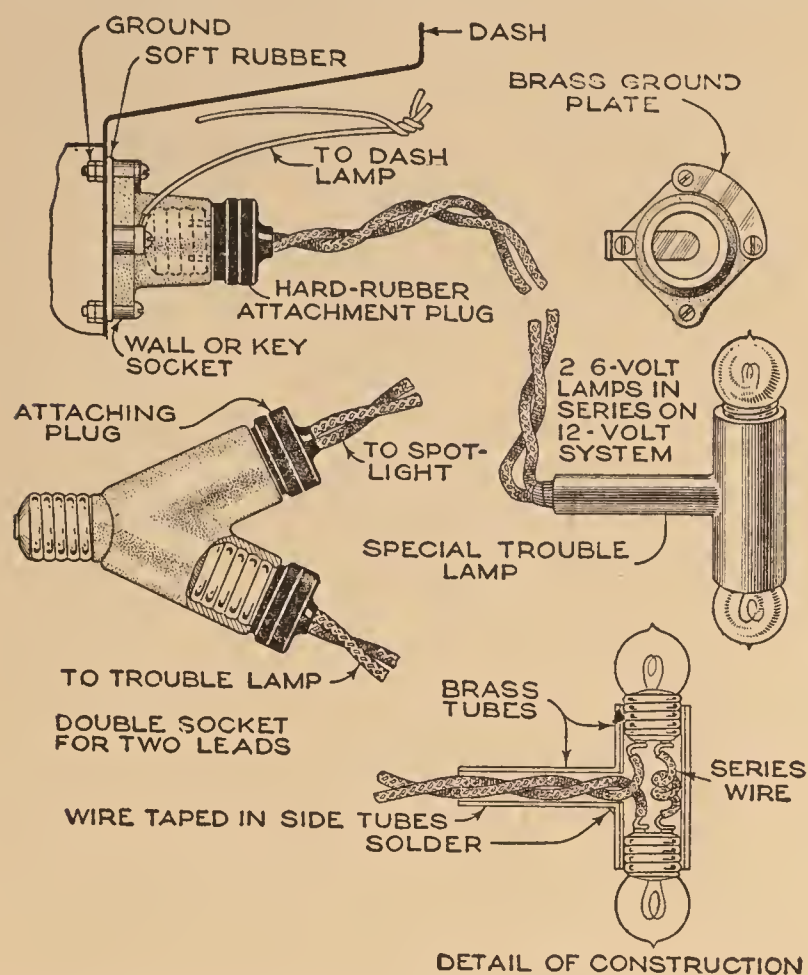


The steam pressure will raise the cover slightly, and allow the vapor to escape through the vent in a horizontal stream. By turning the cover so that the vent is opposite the handle, all danger of being scalded when picking up the teakettle will be eliminated.

❏ Old newspapers soaked in water, twisted tightly, and dried, make good kindling.

Trouble Lamp Installed under Dash

Many automobiles have no provision for plugging in a trouble lamp or spotlight except by removing the dashlight



DETAIL OF CONSTRUCTION

Arranging an Ordinary 110-Volt Lamp Socket on the Automobile Dash So That It will Not Be Necessary to Interfere with the Dashlight When a Spotlight or Trouble Lamp is Used

bulb and attaching the cord there. The owner himself can easily overcome this lack by installing a standard-size 110-volt porcelain socket, of either the plain or key type, under the dash, where it will be out of sight and protected from accidental injury, yet accessible. The large socket is preferable, as it is more substantial and permits the use of standard attachment plugs or two-way sockets. Only two small holes are necessary through the dash for No. 8-32 machine screws and nuts, with a locknut on each, for bolting the socket to the sheet metal. If the one-wire system is used, one side of the circuit being formed by the metal parts of the car, a curved brass plate is run from one socket terminal to one of the bolts for the ground terminal. The other terminal is preferably soldered to the lead running from the dash lamp, unless some other connection is more convenient. A sheet of soft rubber or packing should be placed between the socket and dash.

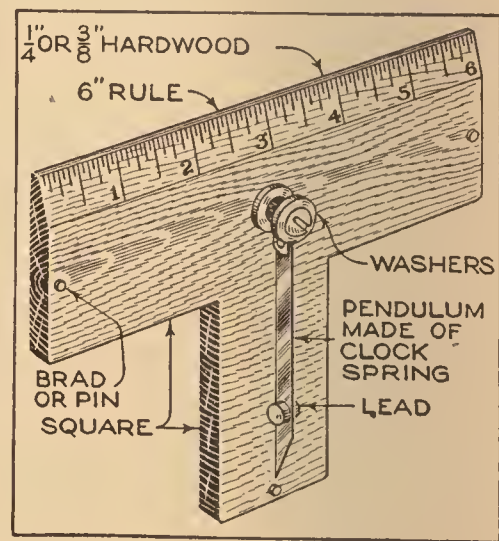
A porcelain attachment plug and cap can be used, though the hard-rubber variety is a little smaller and less breakable; ordinary lamp cord may be used for the lead. The drawing shows the construc-

tion of a homemade trouble lamp, the object of which was to use some old 6-volt bulbs on a 12-volt system; $3\frac{1}{2}$ -volt flashlight bulbs could be used in the same manner on a 6-volt battery. A large and small brass tube are soldered together at right angles, the run of the "T" thus formed being lined with several layers of shellacked or insulating paper, to leave an opening just large enough for the lamp bases to slip into. The lamp cord is threaded through the small tube and brought out at each end of the larger, and each wire is soldered to one terminal of the lamp bases. The other two terminals are connected by a short piece of insulated wire, thus connecting both lamps in series. By drawing back the lamp cord, both bulbs are drawn into the tube, and tape is wrapped around the lamp cord and tube to hold all in place.

By using a two-way socket, screwed into the main socket, a spotlight or other accessory can be plugged in at the same time as the trouble lamp.

Useful Tool for Home Mechanics

Combining a square, plumb, and rule, the tool illustrated is well worth the slight time and trouble required in making it. Wood is used for the T-shaped piece, the long edge of which is graduated in inches and fractions, while the angles formed at the corners are used as squares. The plumb consists of a weighted pendulum, made from a piece of clock spring. Brads, or pins, are inserted at the proper points on the three ends of the device to indicate the true plumb line, when using the tool to test the level of a surface.



Novel Use for the Phonograph

A phonograph may be used to advantage for winding thread, yarn, or cord on a spool quickly and without trouble. A small piece of paper is placed over the turntable spindle, and a spool slipped down over it. The paper prevents the spool from slipping on the spindle. Upon starting the motor the spool will revolve

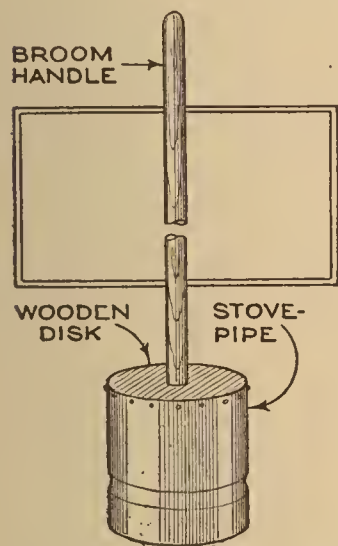
with the turntable so that it is only necessary to guide the material being wound onto it. On most makes of phonographs the turntable can be lifted off, should it be found that it interferes with the winding, but in so doing the motor runs free because the brake that controls the starting and stopping of the machine operates on the edge of the turntable.—Robt. U. Matthews, Mist, Ore.

Clothes Cleaned by Vacuum Cleaner

By using the vacuum-cleaner attachment intended for cleaning the upholstery of furniture, clothing can be cleaned with a minimum of trouble. The garments are laid out flat on a table and gone over several times; the results are much more satisfactory than brushing.—Alvin S. Hinnershitz, Reading, Pa.

Cutter for Strawberry Runners

Strawberry plants send out runners, that, unless kept cut off, permit the plants to spread to such an extent that they cannot easily be cultivated. This and other reasons make it necessary to keep the runners cut short, and the drawing shows a tool that eliminates this back-breaking labor of the strawberry grower. As shown in the sketch, a thick wooden disk is attached to the end of a wooden handle.

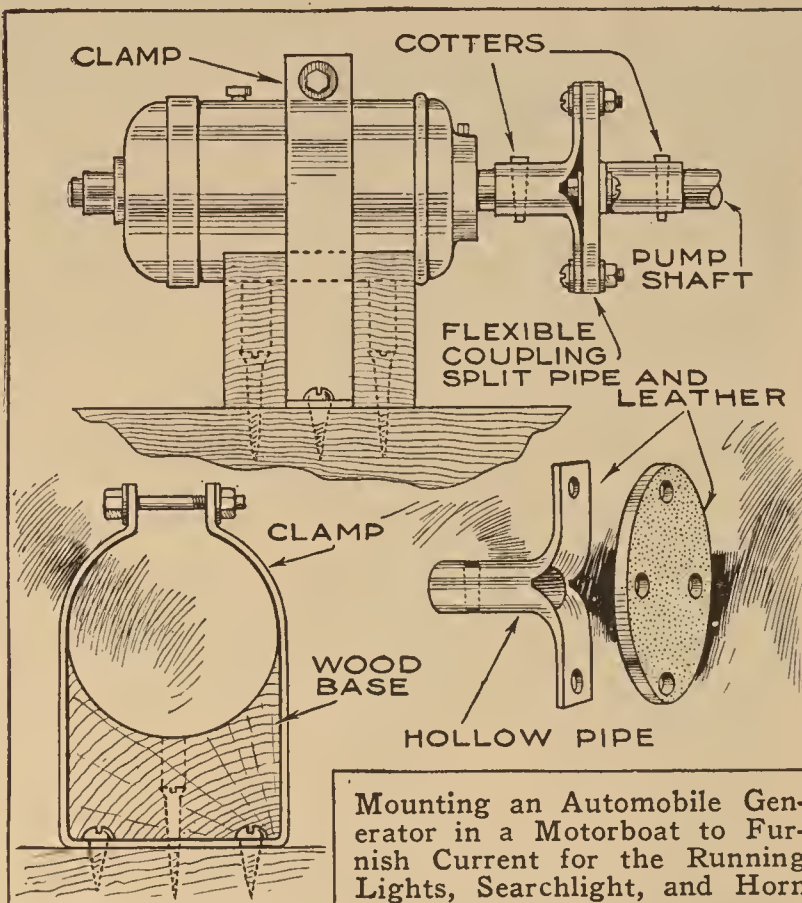


A piece of stovepipe is nailed to the disk and forms the cutter, the edge of which may be filed to make it sharper. In use, the cutter is merely placed over the plant and pressure applied to the handle, severing any runners longer than the radius of the hollow cylindrical cutter.—Luther Holton, Rushville, N. Y.

Attaching Generator to Boat Engine

A storage battery is a most desirable addition to any boat, because of the advantage in using electric running lights, providing current for a powerful searchlight, and for the signal horn. However, the battery alone is more or less of a nuisance, as it must be frequently removed and recharged, if there is no generator. To avoid this, a charging generator, such as can be picked up at any

automobile-wrecking establishment, can be readily attached to almost any make of marine motor. In the case illustrated

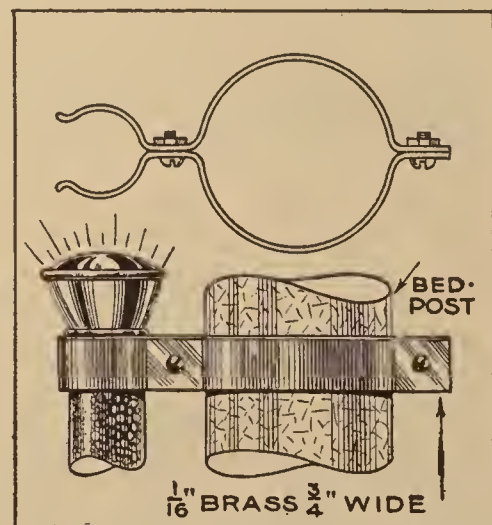


Mounting an Automobile Generator in a Motorboat to Furnish Current for the Running Lights, Searchlight, and Horn

the generator was cylindrical in form, with the cut-out at one end. The pump shaft having been decided upon to drive the generator, the flexible coupling shown in the drawing was made. Pieces of steel tubing were split for a part of their length, and the split ends opened out and flattened. The flattened ends were bolted, at right angles to each other, to a leather disk, and the tubular ends were attached to the generator and pump shafts by cotter pins. The generator itself was held to a wooden block or saddle by means of a simple clamp.

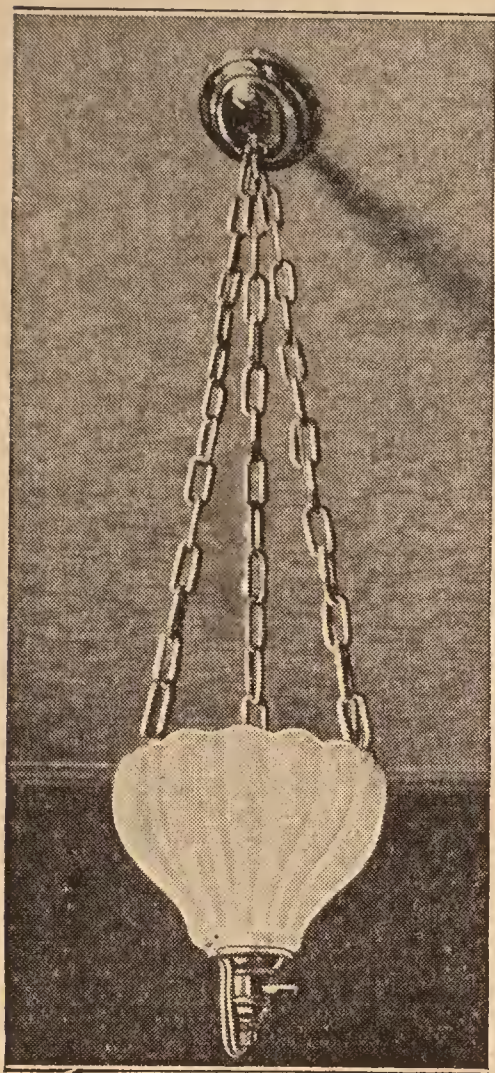
Flashlight Bracket for the Bed

To make the electric flashlight available at any time during the night, a simple bracket can be made and fastened to the bedstead. A piece of No. 16 gauge sheet steel or brass is used. Two strips about $\frac{3}{4}$ in. wide, are needed, and these are bent to fit around the bedpost and flashlight, as shown. After forming the strips, holes are drilled to take two small bolts for clamping it to the bed.



A Cheap Indirect Lighting Fixture

I needed a strong light for some special work, but quickly discovered that the direct glare of

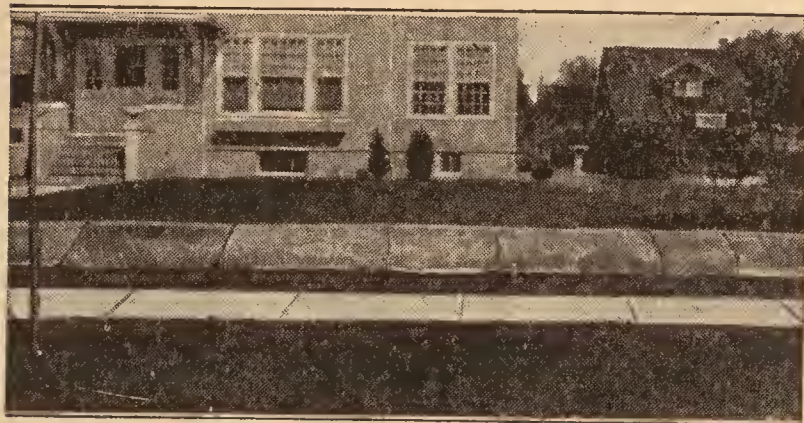


the unprotected 200-watt nitrogen-filled lamp used defeated its own object by causing eye strain, making it absolutely necessary to diffuse the light. Three lengths of brass chain, an eyelet, and a ceiling plate were bought from a 10-cent store, and the regular reflector or shade carrying the lamp was inverted and suspended in the manner shown. The

chains are attached by means of small clamps.—Glen McWilliams, Detroit, Mich.

Protecting Grass Seed on Terraces

A newly seeded terrace can be protected effectively against washing if strips of burlap are laid over it, as indicated in the



Covering a Newly Seeded Terrace with Strips of Burlap to Prevent Washing Away of Soil and Seed

illustration. Not only does the burlap prevent the seed from being washed away when the lawn is watered, but it helps to retain the moisture, and the seed will germinate much more rapidly. The burlap is held against the ground with large spikes or wooden pegs. The seed underneath should be watched and the burlap removed whenever the grass requires it.

Timing Snapshot Exposures

Many amateur photographers, although equipped with good cameras, fitted with fast shutters and lenses, do not succeed in making the best use of them, owing to their confusion of ideas regarding the proper time to give for the exposure. This, of course, as is well known, varies with the season as well as the time of day, and if the subject is investigated, leads to an intricate study of such technicalities as focal distances, speed of plates or films, diaphragm opening, and long formulas, all of which, on account of their complexity, are given scant attention by the average amateur, who is out for pictures instead of a course in mathematics. However, this does not minimize the value of various exposure tables and devices, for, although requiring a little time to get the proper exposure, they are worth while in preventing underexposed negatives. The professional, from long familiarity and a better appreciation of the value of light, and its action on the sensitized plate or film, rarely makes an underexposed negative, because he is taught from the first to make his exposures sufficiently long to get detail in the shadows, the lack of which, to him, is sufficient excuse for terming the negative underexposed.

For the benefit of the amateur, who generally has not the patience to calculate the exposure otherwise, a simple rule has been evolved that fits the case with sufficient accuracy to help him get better exposures, which means better pictures.

Notice the length of your shadow as indicated by some object on the ground to which the shadow just reaches, then walk toward it, counting the number of natural steps that are required to reach the object. Divide this number by 100 and the time of exposure in seconds will be obtained. This should be done only when the lens opening f-11 is used, as usually it is. Applying the rule and taking two steps, the time required for the exposure will be $\frac{1}{50}$ second, $\frac{1}{20}$ second if five steps are taken, $\frac{1}{10}$ second if 10 steps are taken, and so on.

These exposures can be varied somewhat, but should be considered as a close approximation. It is understood, of course, that this rule is only applicable to outdoor photography when the sun is shining.—A. Swanson, Los Angeles, Calif.

¶ The firepot of an old cannon-type stove can be used to make an attractive lawn vase.

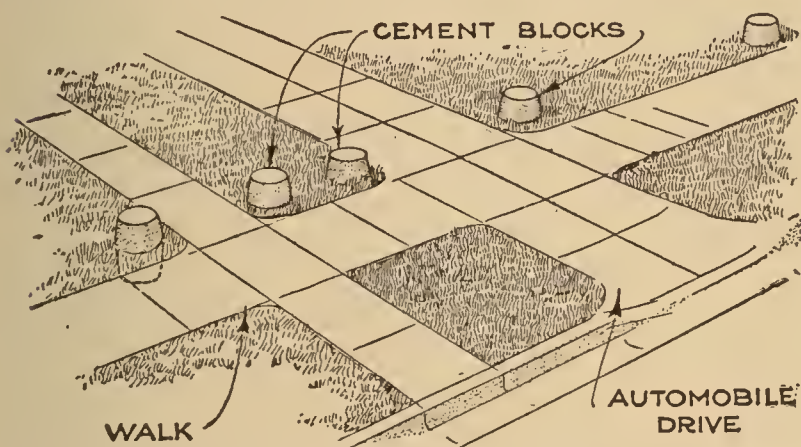
Extracting Broken Cartridges

The sportsman, when using reloaded shells in his gun, is frequently troubled by a head breaking off and leaving the cardboard cartridge tube sticking in the chamber. If the tube sticks too tightly to be removed by ordinary methods, as it usually does, it can be removed by screwing a tap into the cardboard cylinder from the chamber end. This makes it possible, by inserting a rod in the muzzle, to drive out the cartridge by a light blow or two on the end of the rod.—George Glambeck, Milo, Can.

Concrete Blocks Protect Walks and Lawns

To prevent pedestrians and vehicles from leaving their proper paths and getting onto the lawn, cement blocks cast in nail-keg forms are quite satisfactory.

A mixture of one part cement to five parts sand is poured into the keg forms



Concrete Blocks, Cast in Molds Made from Empty Nail Kegs, are Half Buried in the Ground to Protect the Lawn from Pedestrians and Vehicles

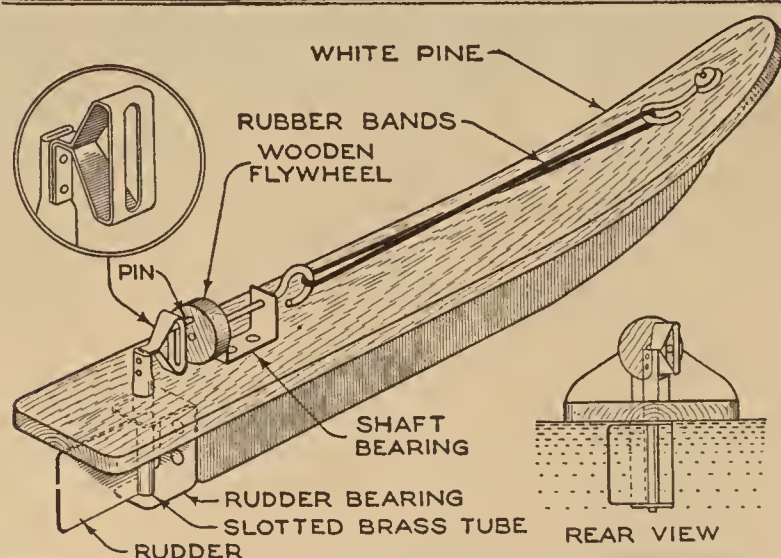
and allowed to harden, after which the kegs are broken away. The resulting cement blocks are half buried in the ground, wherever their use is necessary or desirable.—M. E. Duggan, Kenosha, Wisconsin.

How to Make a "Water Skate"

A novel little water craft, using a rubber band to furnish power, has a rudder at the stern which is swung from side to side, to produce an effect exactly similar to that obtained when a rowboat is sculled forward with a single oar at the stern.

A short piece of light board is curved at the front end to form the hull of the boat, and a vertical keel is fastened to the underside. The rudder, or, more properly in this case, the propeller, is mounted in a bearing fastened to the rear end of the keel. The upper end of the rudder is provided with a slotted tiller in

which the crankpin on the wooden flywheel engages. The method of supporting the flywheel and the shaft to which it is attached, as well as the manner in

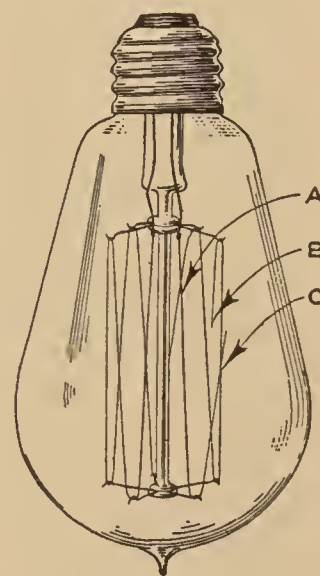


A "Water Skate" Is a Toy Boat Made from a Piece of Light Board and Sculled Forward Exactly as a Rowboat is Propelled from the Stern

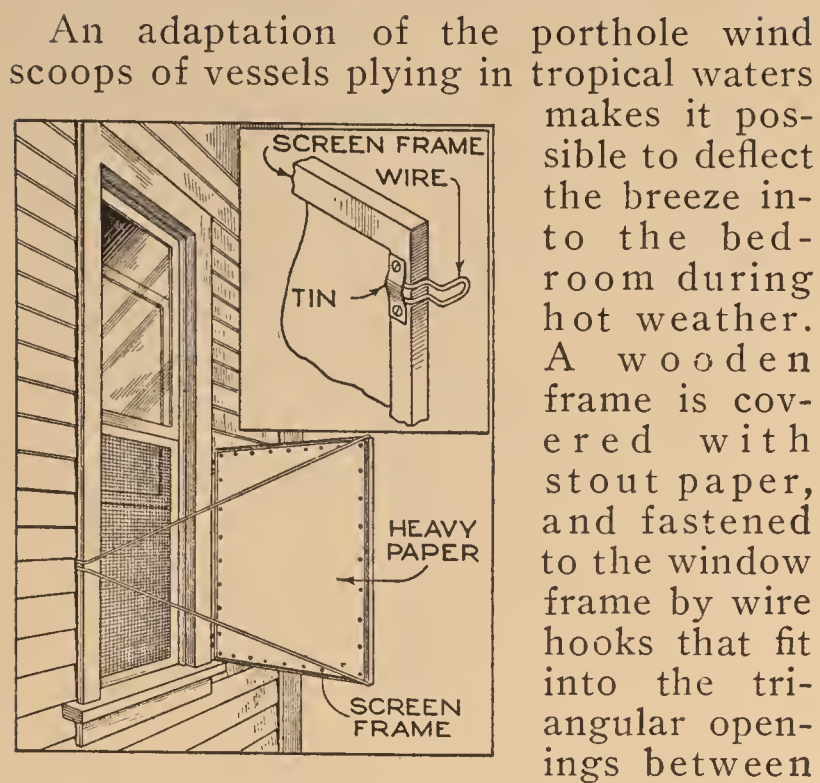
which the rubber-band motor is hooked up, are so clearly shown in the drawing that a detailed description is unnecessary. The boat is made ready for operation by turning the flywheel so that the rubber band will be twisted tightly, producing sufficient tension to drive the little craft forward when it is placed in the water.

Repairing Electric-Bulb Filaments

Many burned-out electric-light bulbs that are thrown away can be saved and restored to usefulness by the exercise of a little patience. It is necessary first to examine the bulb, and determine whether the filament can be mended, by locating the point at which it is broken. If the break occurs very near the leads, for instance, at A, between the points where the wire enters the bulb and where it passes over the first support, repair is impossible. However, if the break occurs elsewhere, between any two of the supports so that part of the filament dangles loosely, as at B and C, careful shaking and turning of the bulb will, in the majority of cases, cause the loose end to come into contact with some near-by section of the filament and complete the circuit. By carefully screwing the bulb into a socket and turning on the current, the filament will be welded into a continuous piece.

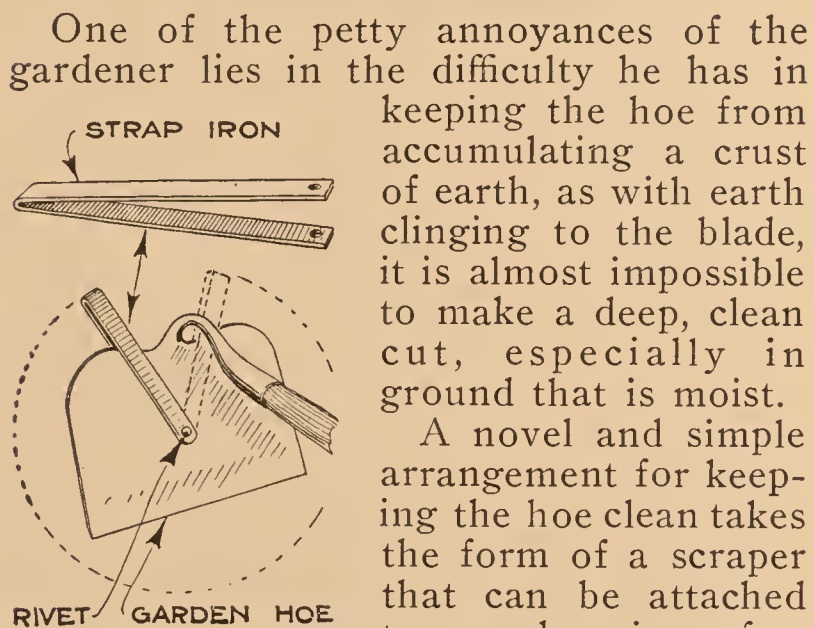


Wind Scoop for Bedroom Window



An adaptation of the porthole wind scoops of vessels plying in tropical waters makes it possible to deflect the breeze into the bedroom during hot weather. A wooden frame is covered with stout paper, and fastened to the window frame by wire hooks that fit into the triangular openings between the frame and siding. A wire stay is hinged to the outside corners of the deflector, and it is hooked around the opposite side of the frame, as illustrated in the drawing. It requires only the work of a second to set up or take down the arrangement.

A Novel Hoe Cleaner



One of the petty annoyances of the gardener lies in the difficulty he has in keeping the hoe from accumulating a crust of earth, as with earth clinging to the blade, it is almost impossible to make a deep, clean cut, especially in ground that is moist. A novel and simple arrangement for keeping the hoe clean takes the form of a scraper that can be attached to any hoe in a few minutes. A hole is drilled through the center of the hoe and a steel corset stay, or similar piece of metal, is heated at the ends and middle to remove the temper. The strip is then bent double and the ends drilled to take a rivet which attaches it to the hoe in the manner shown. The rivet should be hammered down tight enough to prevent the scraper from dropping down of its own weight, where it would be in the way.

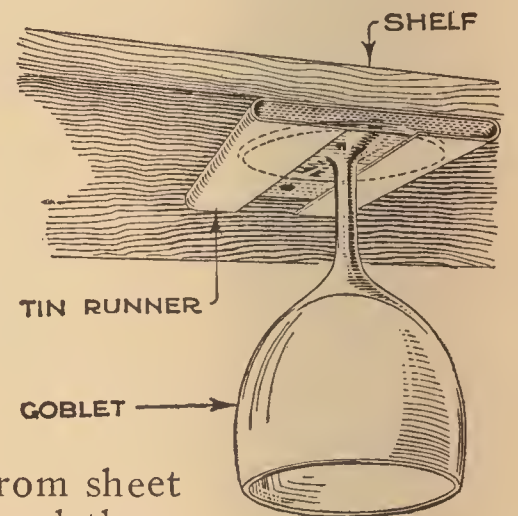
With such an attachment it is only necessary to pull the scraper around as indicated by the dotted lines, to clean the hoe quickly and thoroughly.—G. E. Hendrickson, Argyle, Wis.

Binding Hook to Leader for Salt Water

While fishing in salt water, I had continual trouble from the fact that the binding around the hook and gut became corroded, and it would not be long until the hook would part from the leader under the strain of a struggling fish. This trouble was overcome by binding the hook and gut together with fine copper wire, which is immune to the corrosive action of ocean water.—Henry P. Fuller, Portsmouth, Va.

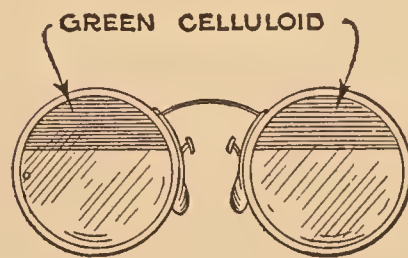
More Room in the China Closet

A woman discovered that, by hanging the goblets and similar stemmed ware from the underside of the shelves, instead of setting them up in the usual manner, more pieces could be accommodated in the china closet. She had several sets of runners like that shown in the drawing made from sheet metal and fastened them to the underside of the china-closet shelves. The runners should be just wide enough for the bases of the goblets to slide into easily.

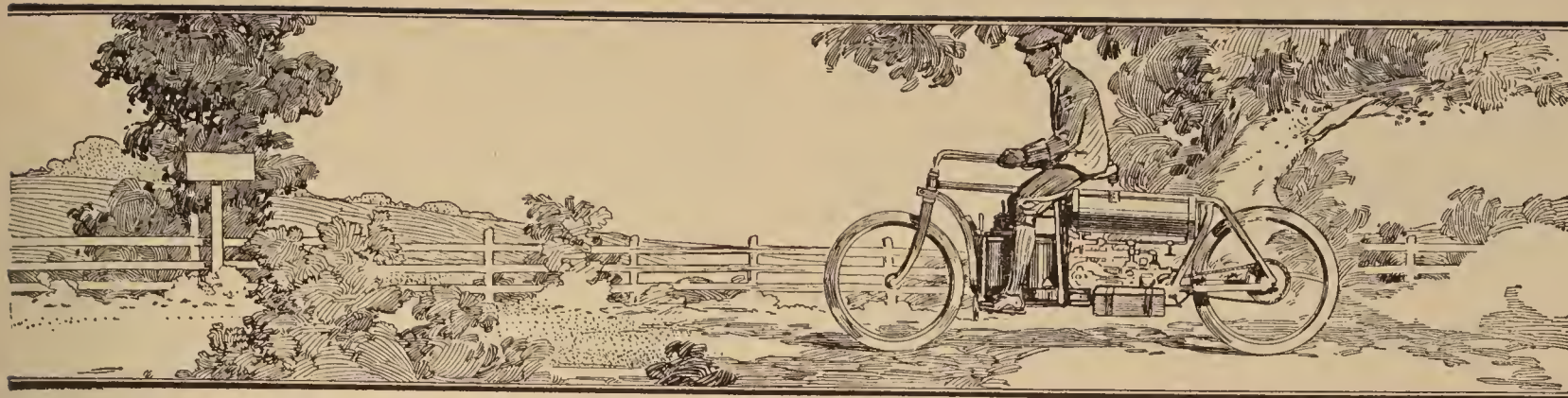


Eye Protection for Motorists

Motorists who are constantly reminded by aching and burning eyes of the glare of the brilliant sunlight when driving by day, or of the flash of oncoming headlights at night, have a simple remedy in the idea illustrated.



Cumbersome and unsightly goggles may be dispensed with by wearing eyeglasses or spectacles having the upper portion of each lens covered with green, blue, or amber-colored celluloid, cut to fit the lens frames. The pieces of celluloid are attached to the lenses at the rim by a light application of glue. This arrangement, while protecting the eyes against glare, allows objects to be viewed in their natural color.—Truman R. Hart, Ashtabula, Ohio.

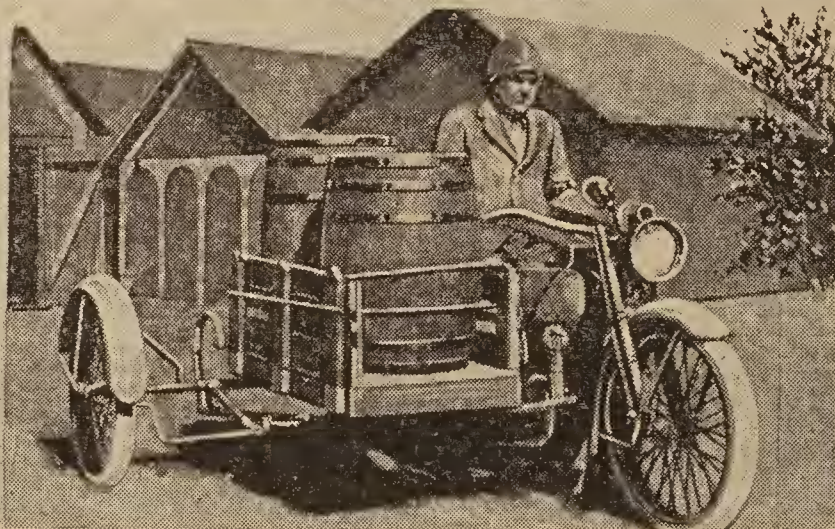
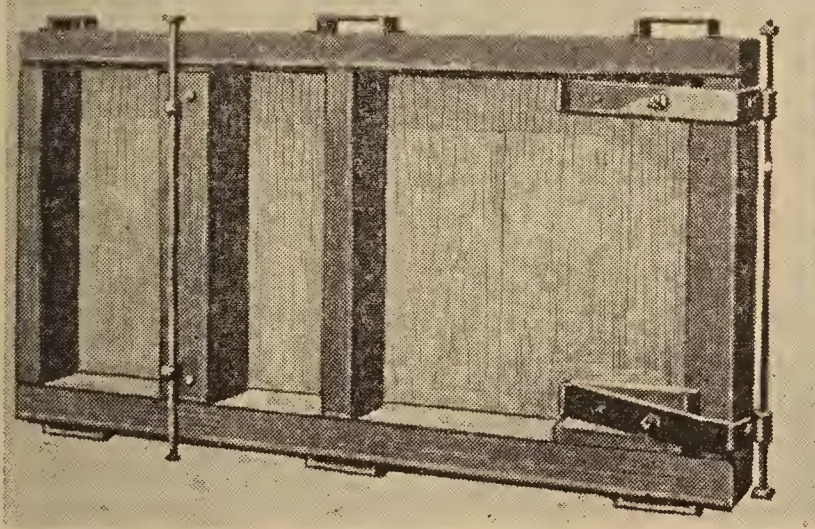
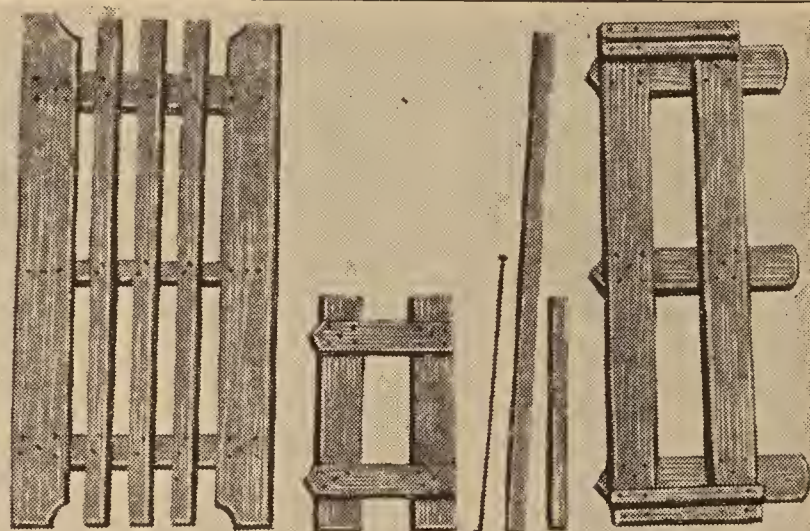
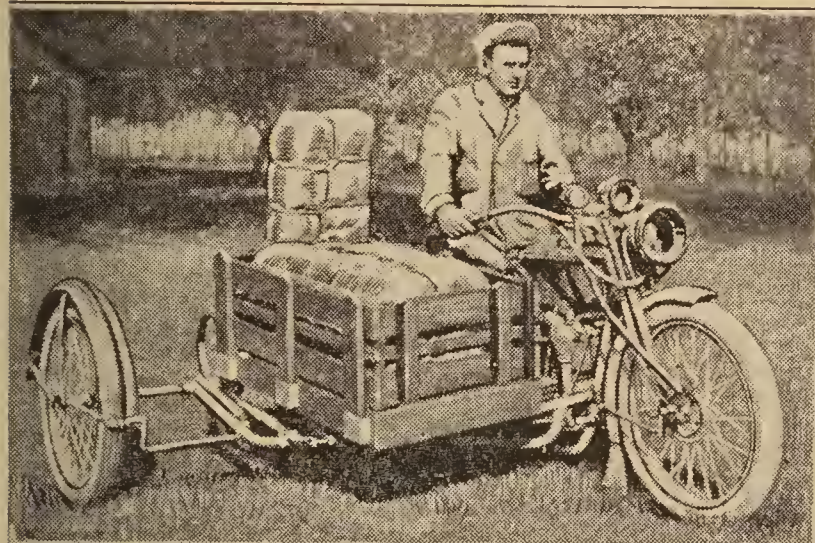


A Motorcycle Delivery Truck

By J. R. KOONTZ

FOR several years we have had in use on our farm what one might call a "speed truck," one for quick delivery, where the weight of the load is not over 300 lb. It is very handy and useful, and there are hundreds of old motorcycles that have been discarded, not because of mechanical imperfections, but because of

make of the cycle used, but in general will not have to be very different from those shown in the illustration. Stake sockets are bolted to the sides of the platform. These are made of flat iron, bent to hold the stakes on the side racks, which have strips nailed to each end to form grooves into which the end members



Upper Left: A Hurry-Up Trip from Town with a Load of Binder Twine. Lower Right: A Load of Two Barrels of Oil for the Farm Power Appliances. Lower Left: Construction of the Platform Frame and Arrangement of the Body Irons. Upper Right: Side and End Members of the Rack Body. The Part at the Left Is a Cover for the Body

their shabby appearance, that are just the thing for such a truck.

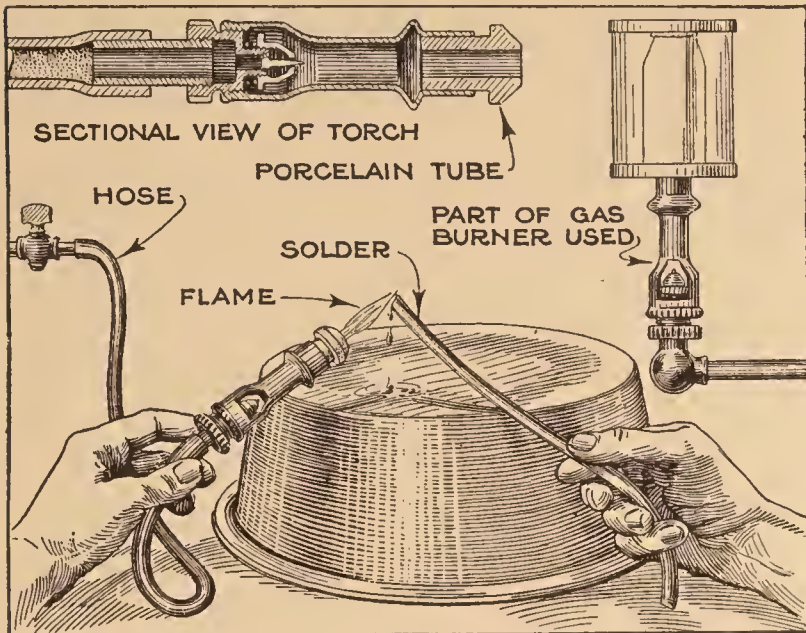
If the motorcycle is equipped with a sidecar, so much the better. Remove the sidecar from the frame or springs and build the platform shown to take its place. This is built up of a framework of 2 by 4-in. lumber, covered with 1-in. boards. The necessary iron fittings for attaching the platform to the sidecar frame and motorcycle will vary somewhat with the

of the rack body fit. Two iron rods, threaded at each end and provided with nuts and washers, will be needed to hold the sides securely against the ends. The narrow strips shown in the upper right-hand illustration are used to make the openings in the rack smaller, for hauling chickens, and a cover for use in the same connection is also shown. A detachable seat can be made for carrying a passenger when necessary.

A truck thus made can be used with profit on any farm, as a gallon of fuel will go twice as far in it as in any other truck that can be made or used; it is especially handy for hauling milk to the station, but there are innumerable other uses for it.

Homemade Soldering Blowpipe

It is possible to convert the burner part of a "junior" incandescent-gas lamp into a soldering torch that will eliminate



By Using the Burner from a Small Type of Incandescent-Gas Light, a Simple Soldering Torch can be Made. The Burner can Still be Used for Its Original Purpose

the necessity of using a soldering iron, except possibly for smoothing off the work.

A short length of pipe is screwed into the bottom end of the burner for attachment to the gas hose, and a 1-in. length of porcelain-tube insulator is inserted into the upper end, to form a nozzle. The porcelain-tube insulator can be obtained from any electrician, and is the kind used to insulate electric wires passing through woodwork. All that remains is to connect the burner to the gas supply with a length of rubber hose, and adjust the supply of fuel at the mixer.—Herbert A. Strickler, Buffalo, N. Y.

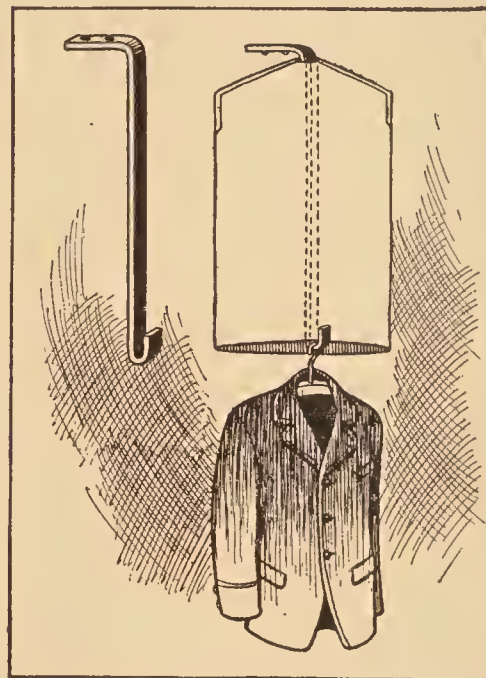
How to Lay Sod Properly

Sod obtained on open land, as, for example, from close-cropped pasture, is the best for lawns. Such sod is exposed to the heat, and, being able to withstand drought, will naturally flourish under the excellent treatment it gets when removed, reset, and given water and every attention. If a drought should occur, this sod is better able to adjust itself to conditions than that taken from cool, sheltered places, where the grass is tender, and more apt to suffer from exposure to the

heat of the sun. The average sod is laid down dry, on a dry surface, and then watered on top; this being so, it is a wonder that more lawns do not die before they can be brought into good condition. It sometimes takes two or three weeks of constant watering and attention to get sod laid in this manner started, while, if some attention were given the matter in the beginning, no trouble would be experienced. A good idea is to bring in the sod in the afternoon before the day it is to be laid. Prepare the lawn for laying by working it up; then sprinkle it moderately. Now arrange the sod in about the place it is to be grown, grass side down. After laying the sod in this manner, sprinkle it. Allow it to remain in this condition overnight, and start turning it early in the morning. Sod treated in this manner will take root and grow at once.

Bags Quickly Placed over Clothing

A commercial dyer and cleaner uses a device that may be of use to others in the same line of business, and that will



also be appreciated in homes where the spare clothing and heavy winter garments are kept in moth-proof bags in the clothes closet.

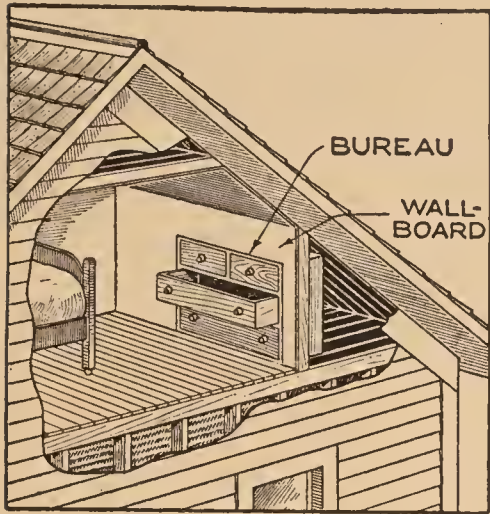
The device consists of a long hook, made of flat iron, which is suspended from the ceiling at a convenient height above the wrapper's head. The bag is slipped up until its lower edge rests on the hook, then the clothes hanger, bearing the coat or other garment, is hung on the hook and the bag slipped down over it. The whole operation requires less time than the telling of it; the desirable features of the device will be apparent to anyone who has struggled with a long moth-proof bag.

¶ When a car is driven in rain or snow and the headlights are fogged, point the spotlight directly on the engine hood. This makes it easy for other drivers to see the machine, so that accidents are prevented.

be suspended, preferably, by wire ropes, in any good spot where there is plenty of clearance for the body, and at a convenient height to enable the occupant of the swing to get in or out easily.—Donald W. Clark, Buffalo, N. Y.

Saving Room Space

Considerable space can be saved in a room in some instances if the bureau is quite literally "built in," something after the

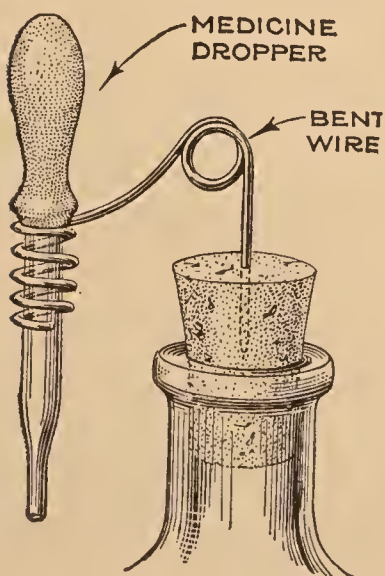


idea suggested in the drawing. This is particularly applicable when partitioning off attic space into rooms, as there is always a great deal of unoccupied space in the angle

formed by the partition, joists, and rafters. This makes a much more attractive and sanitary room than where no partition is employed, as the partition may be decorated, and the room is easily kept clean; it is almost impossible, without a vacuum cleaner, to remove all the dust from the angles of the usual attic room.—L. S. Sterling, Delanco, N. J.

Keeping the Medicine Dropper Handy

The medicine dropper is needed only seldom in most families, but when it is needed, it should be right at hand; to



insure this, the simple little device shown in the drawing can be made in a few minutes. Make a coil of spring-brass wire, giving the main portion about four turns, then bend up a single loop and bend the end of the wire downward, to make a straight, vertical

stem. This end should be filed to a sharp point, which can be stuck into the cork in the bottle. Kept in this manner, the dropper is always "on the job."—L. B. Robbins, Harwich, Mass.

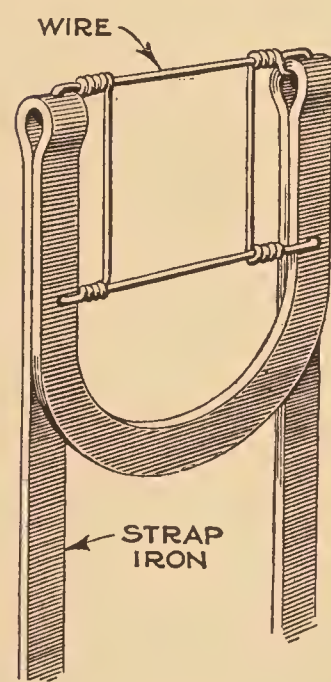
Lens Hood Made from Drinking Cup

The amateur photographer is usually advised, when taking pictures with the lens pointing more or less directly toward the sun or other source of light, to use a lens hood, or cap. The reason for this is to prevent the light from striking the lens directly and causing overexposed spots resulting from the reflection of light. A lens shield of some sort is also frequently necessary when photographing scenes of sunlit snow and water, where reflected light is apt to strike the lens.

An excellent lens shade that collapses into a small space can easily be made from one of the familiar collapsible aluminum drinking cups, such as can be obtained for a few cents at almost any variety store. An opening is cut into the bottom of the cup just large enough to fit snugly over the lens mounting. The inside of the cup should be painted with some dead-black finish to avoid possible reflection.

A Good Foot Scraper

Ordinary types of foot scrapers fail in one thing: The bottom of the shoe can be cleaned on them, but the upper part of the toe, and the sides of the shoe cannot.



With the scraper shown, every part of the foot can be reached.

A long piece of flat-iron bar is bent into a deep U-shape, the legs being spaced about 10 in. apart. The closed end is turned back in the manner indicated, and the projecting ends are either thrust into the ground or fastened to the side of the steps. Holes are drilled as shown, to permit a section of woven-wire fence to be fastened in the top of the U. This square of wire acts as the scraper by means of which every part of the shoe can be cleaned.

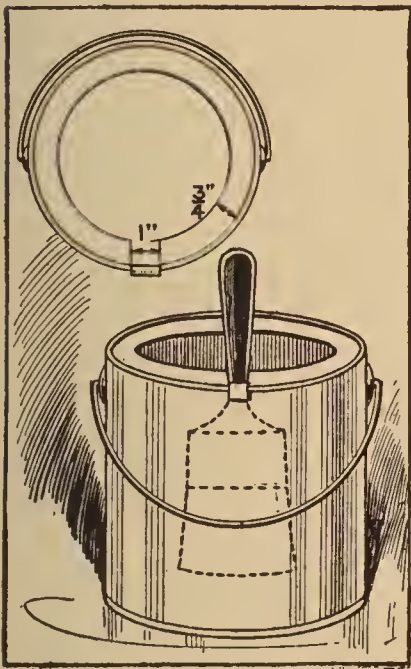
Growing Oriental Poppies

The oriental poppy is the showiest and largest-flowered of all hardy perennials, with its great scarlet or orange cups above a mass of thistlelike foliage; in late May or June it is the sensation of the flower garden. A single packet of seeds

will provide more plants than any one garden can ordinarily accommodate. They should be moved in August, as they are very hard to transplant, and invariably lose their leaves after removal, but these are not dead, and will appear again. It is best to sow the seed where the plants are to remain, rather than to transplant, and thin the seedlings out to about 2 ft. apart. This poppy entirely disappears after its blooming season, so that its location should be marked to prevent the roots from being destroyed by hoeing. It makes a growth of leaves in the fall so that its presence then can readily be determined.

Opening Paint Pails

The drawing illustrates an excellent way to open paint pails that are not fitted with friction tops.



The center is cut out all around, about $\frac{3}{4}$ in. from the edge of the can; this leaves a strip of metal that may be left flat, or bent slightly upward, and that prevents the contents from splashing over the edge of the container. Two slits are cut in this strip, about an inch apart, and the metal between

is bent back, thus forming a convenient holder for the paintbrush. When the pail is not in use, it is best to cover it with a piece of cardboard, as this generally fits better and keeps out more air than a tin lid.—Chas. Homewood, Ontario, Calif.

Judging Prints for Good Sepia Tones

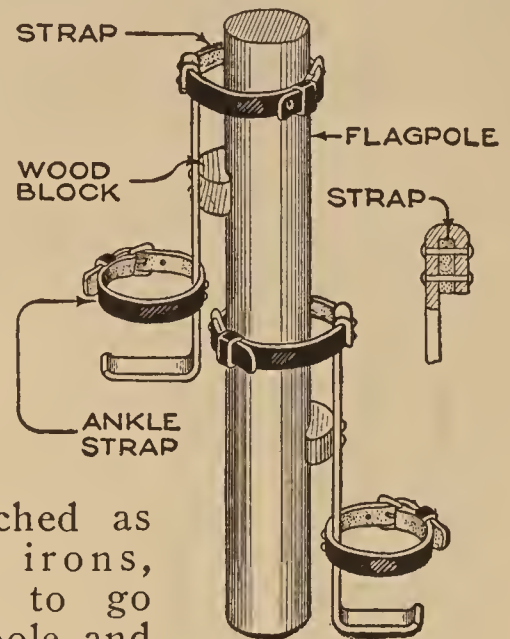
When photographic prints are to be toned sepia, it is necessary that a pure black tone is obtained in the original development, in order that the prints, after redeveloping, may have the desired rich reddish-brown color. An effective way to judge whether any black and white print can be toned to a good sepia color is to view it by the light from a mercury-vapor light. If the black is not pure, it will have a grayish-black tone under this light, but, on the other hand, if it appears as a pure black it will produce a good sepia tone.—Chas. I. Reid, Dayton, Ohio.

Improved Climbing Irons

When a large flag became fouled around three of the flagstaff guy wires, the only way it could be untangled was for some one to climb the pole. To

meet the situation the man undertaking the job built the pole-climbing irons shown in the drawing from $\frac{5}{16}$ by $1\frac{1}{2}$ by $1\frac{3}{4}$ -in. iron. Straps, $1\frac{3}{4}$ in.

wide and attached as shown to the irons, were provided to go round the flagpole and the ankles of the climber, the buckles being placed on the outside so that they could be tightened during the ascent. A block of wood, curved on the underside to conform to the contour of the pole, is riveted just a little above the center of each iron. In use these wooden blocks operate as fulcrums when the wearer's weight is applied, causing the strap to grip the pole tightly.—Maurice Staller, Fowler, Ind.

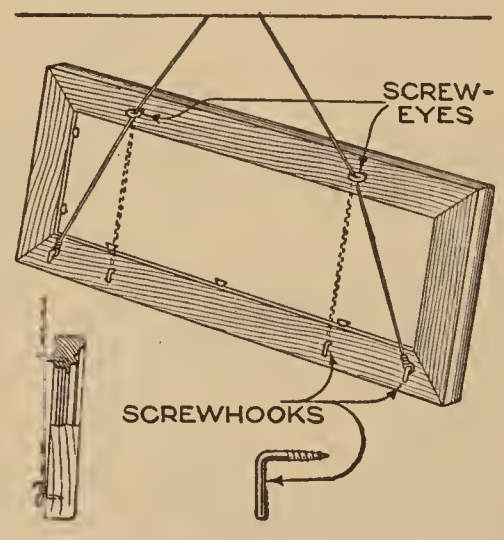


Hanging Framed Pictures

When making a very light picture frame, 3 ft. 6 in. long by 12 in. high, and suspending it in the usual manner, the weight of the

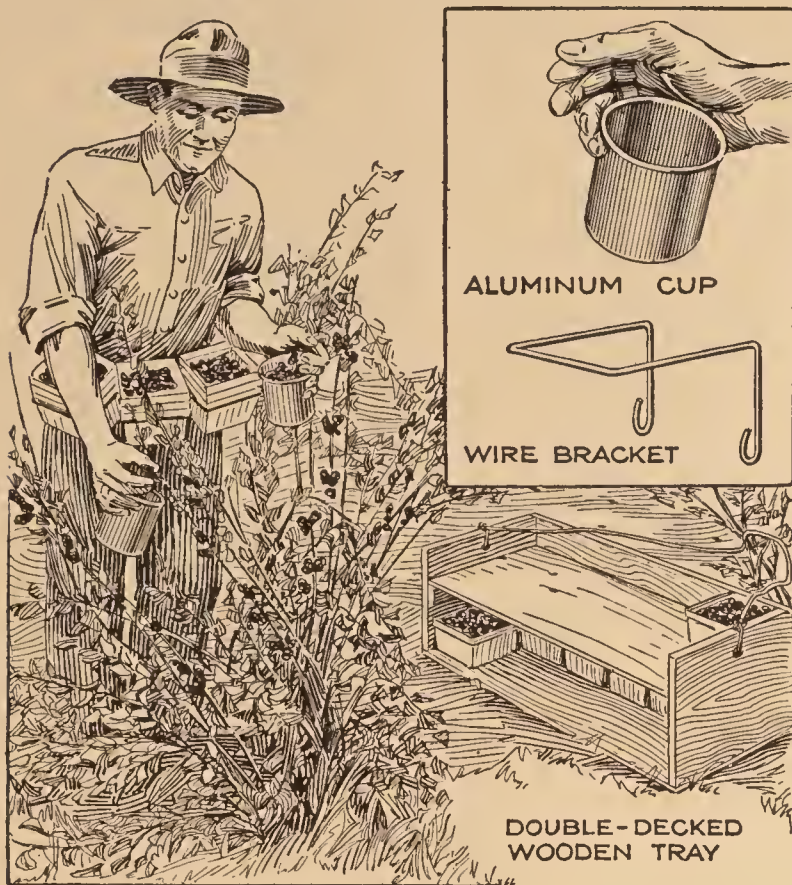
glass was found to create a strain on the lower part of the frame, and to exert a tendency to force the frame apart at the lower corners. To overcome this trouble, the picture

frame was suspended as shown in the drawing, so that the whole weight of the frame was supported by the lower member. Two screwhooks are screwed into this member of the frame, and the wire or cord is passed through screweyes in the upper part. The supporting wire can also be arranged as shown by the dotted lines.



Helps for the Berry Picker

The harvesting of berries, and other small fruits, can not only be speeded up to an appreciable degree by the use of



Conveniences for the Berry Picker That Eliminate a Considerable Amount of Lost Motion, Making It Possible to Harvest More Fruit with Less Exertion

the simple ideas illustrated, but the work may also be made easier. Three wire brackets, of the type shown, are slipped behind the picker's belt and serve to carry several nested boxes; this makes it possible for the picker to carry several empty boxes so that the fruit can be sorted while picking. As the baskets are filled they are removed and left on the ground, and later collected in the double-decked tray, which is carried suspended from the neck. When picking, an aluminum drinking cup may be held in each hand so that the thumb and first two fingers are free to pick the berries and drop them into the cup, thus saving time by the elimination of much waste motion.—G. M. Beerbower, Tarrytown, N. Y.

Restoring Color to Tan Shoes

It often happens that tan and brown-colored shoes, after considerable polishing and wear, take on the appearance of black. When this happens, the shoes can be made to show some of their original color by removing all the old polish. This is done by rubbing them with a gasoline-soaked cloth. After allowing the gasoline to evaporate completely, the shoes are polished in the usual way.—A. C. Cole, Chicago, Ill.

Releaser for Parachutes

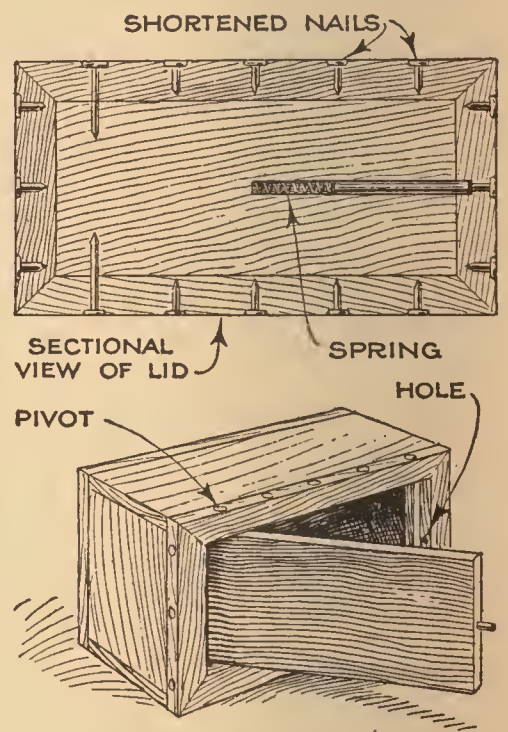
It is a simple matter to attach a parachute to a kite and release it after the kite is in the air. The simplest method is to soak a piece of loosely woven string in a saturated solution of saltpeter and let it dry. This prepared string is used as a slow-burning fuse. The parachute is attached to the kite or kite string with a length of the prepared string, in such a manner that when the latter is burned up, the parachute will be released. Similarly, the shutter of a camera can be opened, by arranging the trip lever so that it will be pulled by a rubber band when the string burns down.—E. J. Bachman, Fullerton, Pa.

A Secret Box Lid

A simple secret box lid, that is proof against being opened by anyone who does not know the secret, is made by pivoting the lid, near

one end, by means of two nails driven through the sides of the box into the edges of the cover. A hole is drilled in the middle of the opposite end of the lid to take a spring and a nail from which the point and head have been cut.

When the lid is closed, the nail is pushed into a hole drilled in the end of the box, locking it securely. To open the box, it is necessary to push the bolt out of the hole in the box by inserting a heavy pin through a small hole, which leads from the outside to the nail socket, and by pressing down on the short end of the lid. The lid can be given the appearance of being solidly nailed by using shortened nails, and some other side may be made to appear as the cover. A shortened nail can be pushed into the small hole leading to the bolt, and, when in position, will conceal this perfectly. Some kind of mark should be made on the head of this nail, to distinguish it from the corresponding one on the opposite end.—Frank Presnell, Chillicothe, Ohio.

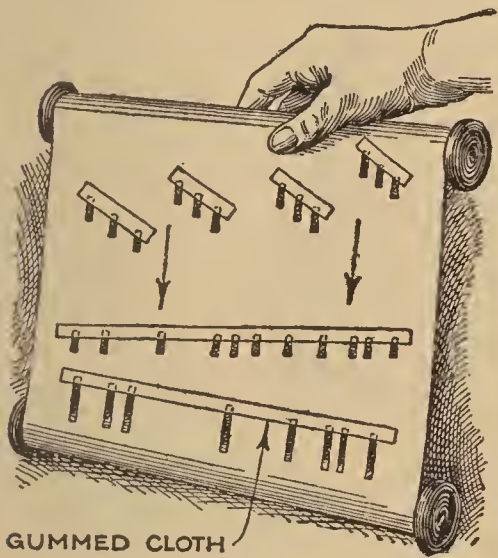


Restoring Typewriter Ribbons

Typewriter ribbons that have been used to such an extent that they produce only a weak impression, can be given additional life by a simple method. Remove the ribbon and spool from the machine, and holding it in one hand, saturate it with alcohol or gasoline. Then pull the free end of the ribbon, while holding the spool tightly, thus causing the coils to compress and force the solvent through the ribbon. The ribbon is then placed in a warm place for about 12 hours, or until thoroughly dry.—Werner W. Baumeister, Cambridge, Massachusetts.

Repairing Player-Piano Rolls

At certain places on player-piano rolls the roll has a tendency to buckle or move slightly to one side, this being specially noticeable on rolls that have been used for some time. This is due to the fact that there are a large number of holes at that point or that the holes are so placed as to weaken the paper. Continued use of the rolls aggravates this condition as the paper becomes soft and warm. A



good way to prevent this is to paste a piece of gummed cloth on the roll, keeping as close as possible to the holes without covering them. In some cases this is impossible, owing to the position of the holes. Then, a portion of the holes may be covered, taking care always to cover the back end of the openings, that is, the portion of the holes which is last to pass over the tracker board. The leading end of the holes should never be covered as that will cause the notes to be played slightly late, and to cover the center of the holes will cause two short notes to be played instead of a single long one. By covering the back end of the holes, the notes are merely shortened a trifle; this will not be found objectionable, and, in fact, may even be desirable in some cases, as the music becomes more "snappy." The gummed cloth should be placed on the side of the paper that shows while in operation.—R. H. Kasper, Philadelphia, Pa.

A Double-Action Garden Hoe

By cutting out a portion from the center of the blade of a hoe and pointing the projection on each side, an ordinary hoe is converted into a tool that permits cultivating on



A Fork-Shaped Hoe, Made from the Standard Garden Hoe, Makes It Possible to Save Time by Working on Both Sides of a Row of Seedlings at the Same Time

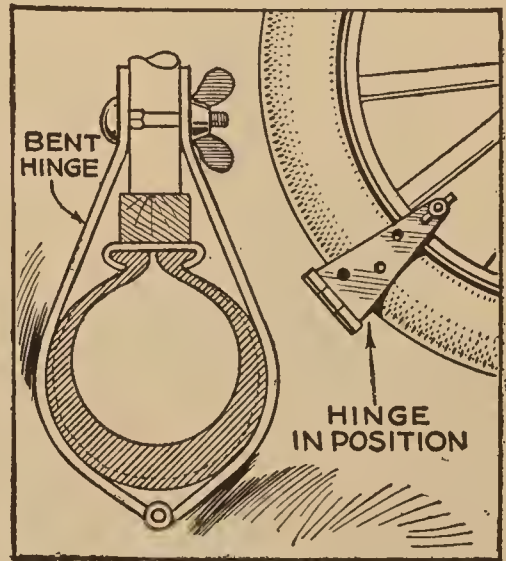
both sides of a row of seedlings at the same time, thus minimizing the time and effort used.

The blade is cut along the dotted lines, as shown in the drawing, with a cold chisel, and the rough edges are afterward smoothed down by filing or grinding. The implement is used as illustrated, and will be found quite effective for cutting small weeds and loosening up the soil around the roots of the plants.—Gregor H. Glitzke, Kansas City, Mo.

Auto Mudhooks Made from Hinges

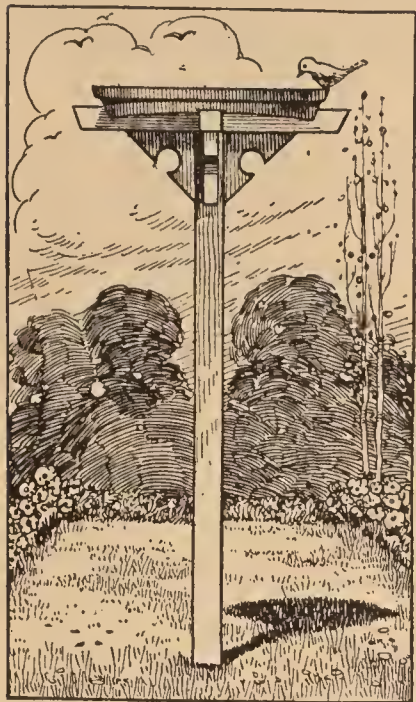
Strap hinges of a familiar type can be made into very satisfactory mudhooks for the extrication of a car from mud or sand. How-

ever, the hinges should be of rather large size, for they must be bent, as shown in the drawing, so that the ends are in a line inside the wheel rim. The mudhook thus formed is clamped to the wheel by a bolt and wing-nut.



A Bird Bath of Simple Design

No garden can be considered quite complete without a bird bath of some sort, and it need not be an elaborate or expensive affair of concrete or stone to attract the birds, who are more appreciative of the water than of the container.

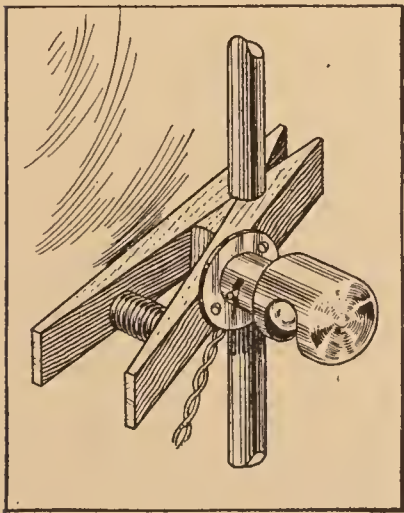


The drawing shows a simple design for a bird bath that can be executed at minimum expense of time and cost of material. A suitable length of 2

by 2-in. stock is used for the upright support, which is driven into the ground. An earthenware dish, such as flowerpots are set in, preferably one about 16 in. in diameter and about 2 in. deep, is used as a container for the water. Four horizontal arms, each 1 ft. long and 1½ in. square, are fastened to the sides of the support to bear the dish. These arms are mortised, to make an opening into which the dish is inserted and which prevents it from being accidentally pushed off. Simple brackets underneath the projecting supports can be used to add to the appearance and solidity of the completed bath.—Leo Rosasco, Indianapolis, Ind.

Trouble Lamp Mounted on a Clothespin

An arrangement by means of which an inexpensive dash lamp can be made into a convenient trouble lamp, that occupies little space in the tool box, requires nothing more than a spring clothespin.



The lamp socket is fastened to the clothespin and provided with a suitable extension cord and plug.

The use of the clothespin permits the lamp to be clipped to many parts of the car, and thus both hands are left free.—J. G. Brown, Evanston, Ill.

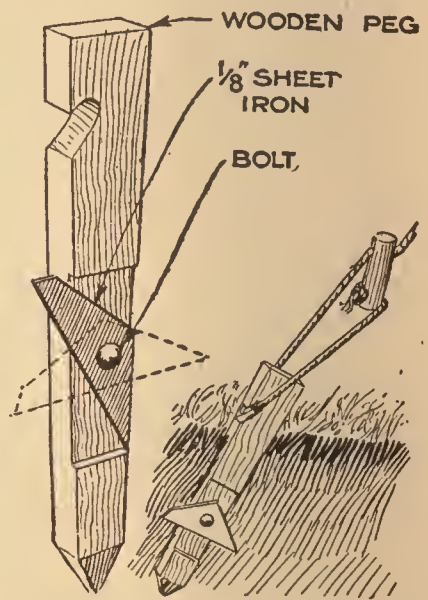
Unusual Fish Bait

A Pacific-coast fisherman has devised an original and successful method of catching salt-water fish. A wide-mouthed, clear-glass bottle is used after the bottom has been removed. A cork, to which a pair of hooks is attached to hold the minnows that constitute the bait, is fitted into the mouth of the bottle. Wire rings around the bottle at two places have a series of hooks attached to them, the rings being held the proper distance apart by wires which terminate in a loop over the cork; the entire bait is attached to the line with a swivel to prevent twisting.

With the bottom of the bottle removed the weight is diminished when it is being pulled out, and although the bait is quite effective, due to the transparency of the glass, the fish is prevented from getting anything but a hook on the outside of the bottle.—C. C. Wagner, Redondo Beach, Calif.

An Improved Tent Peg

Many different ideas have been applied to making a tent peg that will not pull out of the ground, but the one illustrated has the merit of using the cheap and easily obtained wooden pegs with a simple attachment that prevents them from being pulled out by accident.



A mortise is cut on one side of the peg to accommodate a triangular piece of sheet iron, pivoted to swing freely. The pegs are driven in the usual manner, but when any undue strain comes on the tent ropes, the sheet-iron piece assumes the position indicated by the dotted lines and locks it as securely as the character of the soil will permit.

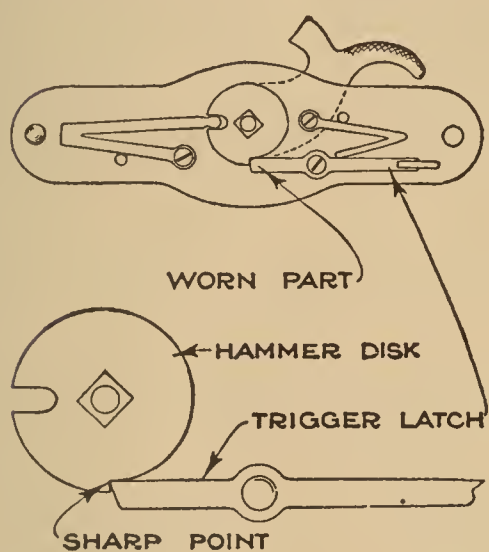
Cooling Breezes from the Vacuum Cleaner

The ordinary suction cleaner can be used to cool the temperature of a room without alteration of any sort. Simply place the cleaner over one of the hot-air registers and remove the dust bag. Be sure that the fresh-air intake pipe from

the outside of the furnace is open. If there are no furnace registers, the same effect can be obtained by setting the cleaner near a door or window. In either case see that the nozzle of the machine is raised slightly from the floor so as to allow free suction of air. When the current is turned on, a strong blast of air will be delivered through the dust-bag opening.—Chas. J. LeCompte, St. Louis, Missouri.

Repairing Gun Locks

After a double-barreled shotgun has been used for a long time, trouble is often experienced in keeping the hammers



they occasionally snap off apparently without cause, and make the use of the gun exceedingly dangerous. This trouble is caused by the wearing of the point of the trigger latch, as shown in

the drawing. An accumulation of dirt in the notch of the hammer disk will also prevent the latch from getting a good hold. The remedy for both troubles is simple. Remove the side plate of the gun, take off the trigger latch, and with a fine file bevel off the end of the latch, removing as little metal as possible. After cleaning out the notch in the disk and giving it a light coat of vaseline, the lock is reassembled.

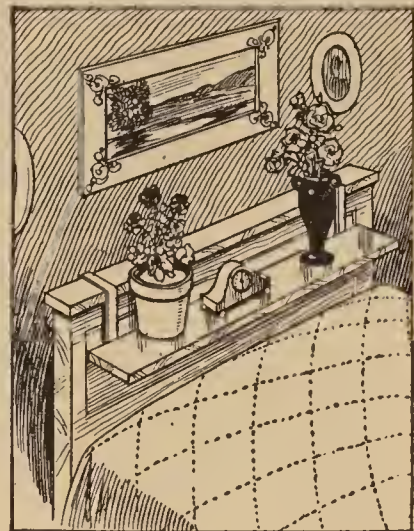
Preventing Use of Hose Faucet

Many persons try to prevent meddling with hose faucets by removing the little T-head keys by which they are turned. This kink almost always results in the stem of the faucet being rounded off by the application of pliers and other tools.

A more effective preventive, and one that is free from this drawback, is the application of a $\frac{3}{4}$ -in. pipe cap over the threaded end. The cap can easily be screwed on with a pair of pliers, or even by hand, to prevent the meddling of children. This is also an excellent method of stopping dripping faucets until new washers can be fitted.—Doncaster G. Humm, Phoenix, Ariz.

Bedstead Shelf for the Sick Room

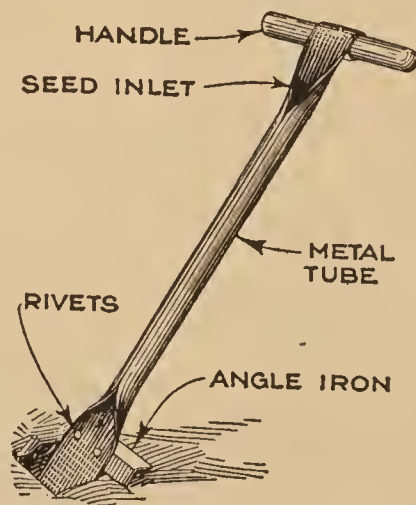
The days in a sick room are monotonous and soon make the patient nervous and fretful; a note of cheerfulness and variety, however, may be introduced by making a shelf to hook over the foot of the bed, on which fresh flowers, pictures, or other articles can be placed. The same shelf can be used with any style of bedstead, whether of wood or metal. Two iron hooks and a narrow board are the only parts required. Articles suggestive of the patient's condition, such as medicine bottles and the like, should not be placed on this shelf, but kept out of sight as much as possible.—Robert H. Neill, Ottawa, Ohio.



A Simple Seeder

When dropping seed in the corn hills, or planting the pumpkin or the melon patch, the stooping that is necessary in order to drop the seeds in the proper place makes the job somewhat fatiguing. So, to make such work easier as well as simpler, the seeder in the drawing was devised.

A piece of thin tubing, about $\frac{3}{4}$ in. in diameter and 4 ft. long, was split at each end for several inches, and the split portions flattened

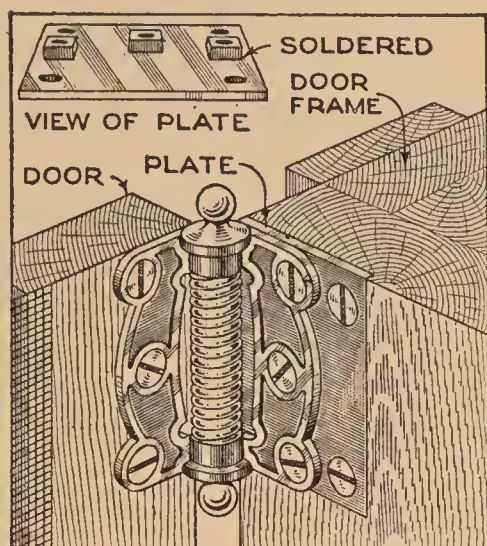


out; one end was bent around a piece of an old broom handle; the opposite end was sharpened, and about 3 in. from the point, a short piece of light angle iron was riveted to the back to serve as a foot step for forcing the tool into the earth. As this step is in a fixed position, the seeds can be planted to a uniform depth.

To operate this seeder, it is forced into the ground, and the seeds are dropped through the opening at the top and fall into the cavity made by pushing the tool forward. By placing the foot in front of the blade, as it is withdrawn from the earth, the seeds are held and covered.

Permanent Screen-Door Fastenings

The necessity of using larger screws or plugging worn screw holes every year, when the screen doors are put up, can be

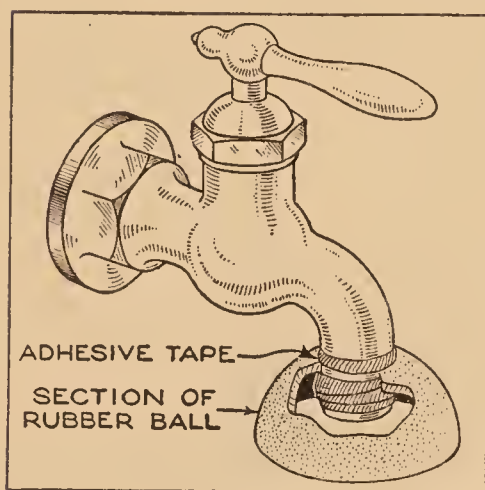


overcome by adopting the idea illustrated. A small iron plate is fastened to the door frame with four screws; this is a permanent fixture. Before fastening the plate in position, holes

are drilled through it which coincide with those of the hinge. On the reverse side of the plate, and exactly over the holes, nuts are soldered. Flat-head screws are then run through the holes in the hinge of the screen door to take the place of the ordinary wood screws. The wood underneath the nuts is countersunk with a drill so that the plate will come flush with the door frame.

Faucet Guard for Dishwashing

Part of a rubber ball was used by a householder to prevent dishes from being



nicked and broken by contact with the faucet, while washing them in the sink. The ball was cut in two, and a hole, a little smaller than the diameter of the faucet

spout, cut in the cup thus formed. The cup was then forced over the faucet in the manner shown, and held in place by adhesive tape.—Truman R. Hart, Ashtabula, Ohio.

Swimming under Water

The following instructions, when carefully followed, will enable any normal person, who can swim, practically to double the length of time he can remain under the water. The usual method of nearly all swimmers is to take the deepest

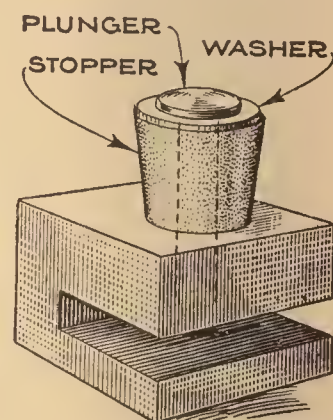
breath possible before plunging; they generally swim in a haphazard way, and come to the top just as soon as they think they are getting out of breath.

To break one's own record, one should observe the following rules: First, take several deep breaths, and then blow every particle of air out of the lungs, instantly draw in a full, deep breath, and then dive, going down deeper than usual; second, take regular strokes, about one a second, and always try to go one stroke farther than in the last dive. By counting the number of strokes taken under the water, the swimmer's confidence is wonderfully increased, and he also is able accurately to judge his location at all times.

The ability of a person to remain under water can be tested on land by practicing the above method and timing himself with a watch. This is the method used by most professional swimmers.—Carroll Pfleeger, Milton, Pa.

Rubber Stopper Used as Spring

A small punch, used for punching holes in the leaves of a loose-leaf ledger, was repaired in a simple manner when the spring that returned the plunger became broken. In order to make the punch serviceable until a new spring could be obtained, a rubber stopper was used. A hole, a little larger in diameter than the punch, was drilled through the center of the stopper and the latter inserted into the tool opening in place of the spring. Then, after a washer had been placed underneath the head of the punch, it was inserted through the hole in the stopper. When the plunger was forced down, it was automatically restored to position as soon as the pressure had been released.—Dale R. Van Horn, College View, Neb.



Drying Yellow Poplar

Yellow poplar lumber, fresh from the saw, can be dried quickly and the danger of staining reduced to a minimum by piling the boards on end. The object of this is to permit the moisture to drain off freely and improve the circulation of air around the boards. Lumber dried in this manner will be bright and clean, and can be shipped after a few weeks.

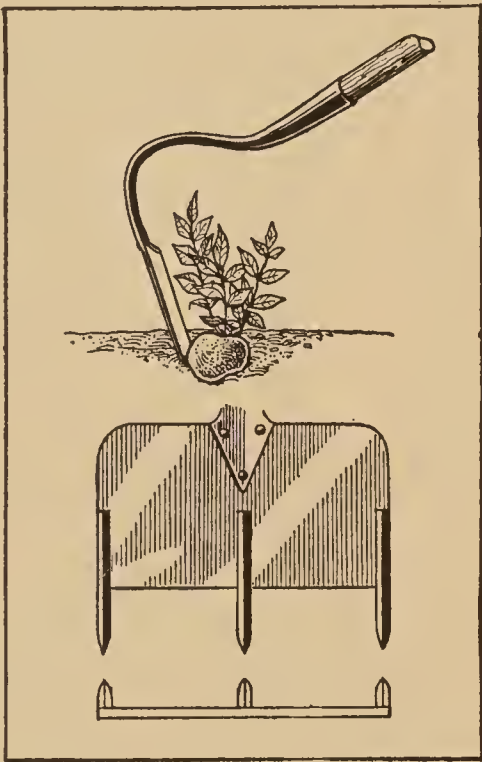
Planting Corn

It is much better to plant four rows of sweet corn 5 ft. long side by side than it is to plant one row 20 ft. long with as many plants. The former method will produce more and better corn than the latter, because there will be a better distribution of the fertilizing pollen, as, the rows being closer together, the wind will carry it between the rows. In a long single row, the greater portion of the pollen will be blown away without falling upon the silk to fertilize it and produce the corn. Each silk fertilized means more kernels of corn on the cob, and failure of proper fertilization causes bare spots upon them.

Guard Prevents Dulling of Hoe

Gardeners, amateur and professional, often damage or ruin the edge of their nicely sharpened hoe by striking a concealed rock.

In order to prevent this, at least to a great extent, the guard illustrated may be used with good effect. It consists simply of three narrow blades, attached to the face of the hoe, with the points extending about $\frac{1}{2}$ in. beyond the edge of the implement.



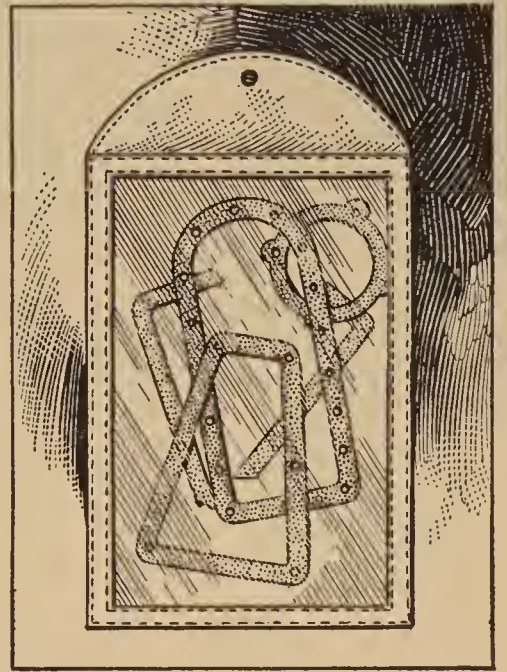
The blades are made of stock heavier than the hoe, and the end and faces are sharpened. If large stones are encountered, the points of the blades take the bump, and even though they become dull, they do not prevent the hoe from entering the ground easily. To make a smooth job, the blades should be welded to the hoe.

Skate Aids in Moving Furniture

Having occasion to move a heavy display table from one end of the store to the other, a distance of about 70 ft., without help, I placed a roller skate under each of the legs at one end, and thus rolled the table along to its new position easily.—H. B. Nissly, Sioux Falls, S. D.

A Carrier for Cork Auto Gaskets

The flimsy cork gaskets used underneath the various cover plates and about practically every detachable part of an automobile engine, are difficult to handle without breaking, which makes them practically unfit for use. To minimize the danger of breakage, and consequent loss, a serviceable but simple carrier can be made that not only protects the gaskets but keeps them always visible, so that the mechanic can select any one of them without delay. This carrier is made from the back curtain of an old automobile top, containing a square or rectangular celluloid light. The material is sewed over the light to form an envelope, into which one or more sets of the gaskets can be placed, and as the carrier can be dropped and otherwise mishandled with small risk of damage to its contents, the saving will rapidly pay for the trouble involved in making it.



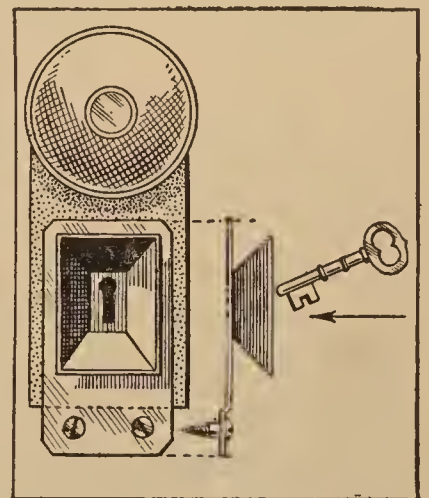
The carrier is made from the back curtain of an old automobile top, containing a square or rectangular celluloid light. The material is sewed over the light to form an envelope, into which one or more sets of the gaskets can be placed, and as the carrier can be dropped and otherwise mishandled with small risk of damage to its contents, the saving will rapidly pay for the trouble involved in making it.

Key Guide for the Back Door

By means of the key guide shown in the drawing, one can locate the keyhole in the darkest night as easily as during the day. The entire device is made from sheet metal. Four strips, each about 1 in. wide, are formed

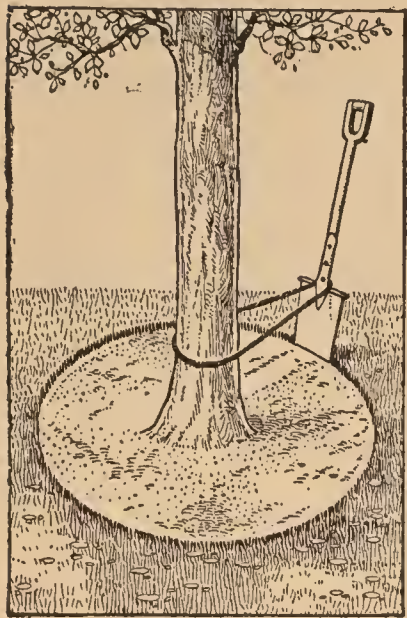
into a flared frame and soldered over a square opening cut out of a flat strip of the same material; this should be a trifle wider than the guide proper. In use, the attachment is fastened to the door with two screws, so that the keyhole comes in the center of the square hole.

As the key is inserted into the guide, the tapering sides cause it to be directed toward the keyhole.



Cutting Sod around Trees

To cut the sod from around the trunks of trees, and at the same time form a circle,

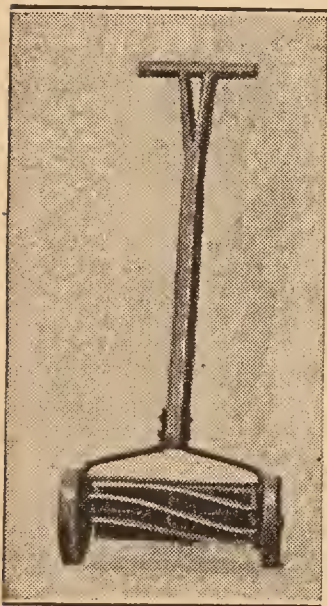


is a little more difficult than is generally realized. However, by the method shown in the drawing it is possible to describe a circle and cut the sod at the same time. A loop of rope is tied around the tree and the spade is inserted into the opposite end. A circle of any desired diameter

may be obtained by increasing or diminishing the radius, represented by the length of the loop of rope.—Doris Johnson, Rockford, Ill.

A Strong Mower Handle

In the rare cases that the handle of a lawn mower becomes broken, another, as strong and serviceable as the original, can easily be made from a strip of oak of the same dimensions.



The new handle is split down its center for about 14 in. at one end, and a $\frac{1}{4}$ -in. bolt is inserted into a drilled hole about an inch below the bottom of the cut, and tightened, to prevent the piece from splitting. The split end is then steamed and the outer ends bent about 4 in. apart. A

tenon on each of the bent parts is fitted into a corresponding mortise in the handle, which is made from a 14-in. piece of the same stock as the handle.

An Auto-Theft Alarm

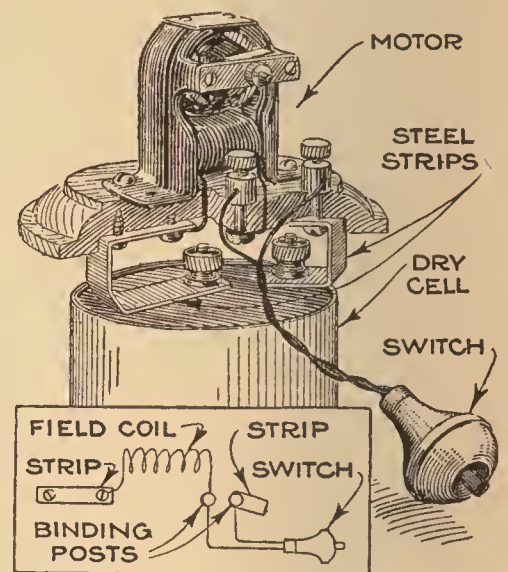
State laws and municipal ordinances, in most cases, make it practically impossible to lock an automobile so that it is immovable, by chaining the wheels or locking the brakes. However, the use of alarms is not prohibited, and it is consequently possible to wire the horn of the car in such a manner that it will

begin to blow as soon as the engine is started, and continue to do so as long as it is operating. This is accomplished by mounting a concealed switch underneath the cowl, which must be opened when the engine is started, and running a wire from the generator to the horn; this does not interfere with the usual operation of the horn from the button on the steering wheel. Consequently, with the engine stopped and the switch closed, the horn will commence to blow as soon as the generator begins to operate.

Simple Mounting for Small Motor

When using a small electric-battery motor for different experiments in the amateur's laboratory, it is generally found that the units, when connected in the usual manner, are awkward to move about.

To combine the two, the motor is mounted on the top of the dry cell



by means of two steel, brass, or copper strips, attached to the underside of the motor base, bent as shown, and clamped to the binding posts of the battery. A switch of the type illustrated, or of any other type desired, is connected to the binding posts on the base of the motor, so that the latter can be started and stopped as desired.—W. A. Saul, Cambridge, Mass.

The F-Numbers of Lenses

The F-numbers of photographic lenses, such as F/7.5 and F/6.3, etc., indicate the working aperture of the lens at which good definition is to be had, and hence the speed of the lens. The numbers themselves indicate the quotient resulting from division of the focal length by the diameter of the largest diaphragm opening. Thus, F/7.5 means that the diameter of the diaphragm opening is contained in the focal length 7.5 times; also, it may be seen that the smaller the number of any particular lens the larger the corresponding working aperture and the shorter the necessary exposure.

A Small Electrically Heated Steam Boiler

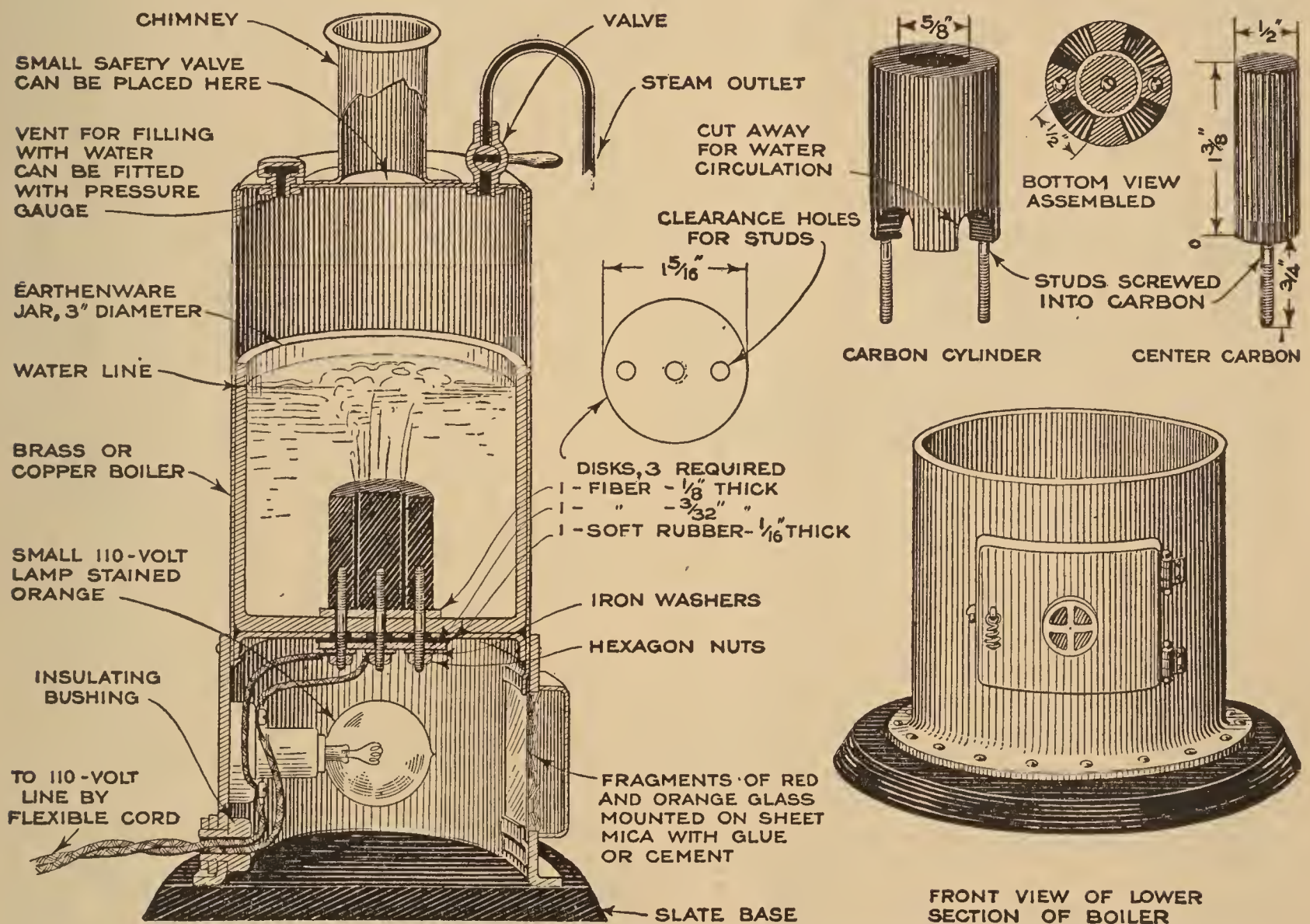
BY A. N. CAPRON

A GREAT many amateur mechanics have frequent need of some apparatus that will supply steam under light pressure for the operation of model engines, turbines, and such incidental work as opening storage batteries; and it is for just such purposes that the electrically heated boiler shown in the drawing was designed.

First, an earthenware bottle, or jug, of the size required is obtained; this is cut off about $3\frac{1}{2}$ in. from the base, the operation being easiest performed on an emery grinder. Two pieces of hard carbon are required, which are drilled and formed to the dimensions shown in the drawing, the bottom of the larger piece being cut away,

the studs must be drilled through the bottom. This is accomplished by first chipping off the glaze and drilling the holes with a twist drill kept moistened with turpentine. The holes having been drilled, a boiler is made from sheet brass, copper, or iron to correspond with the dimensions of the earthenware jar, as shown in the drawing, with a horizontal support for the jar to rest upon.

This latter piece, which forms the top of the fire box, is drilled to give ample clearance for the studs and should be free from contact with them, as indicated. To prevent any possibility of the water or steam working its way between the earthenware jar and the boiler shell and



An Electrically Heated Steam Generator for the Amateur Mechanic's Laboratory Which will Supply Sufficient Steam for the Operation of Experimental Engines, without Fire Danger

as indicated, to permit free circulation of water around and through the heating element. Both carbon pieces are drilled to take brass studs which may be made by threading short lengths of $\frac{3}{32}$ -in. brass rod; these are screwed into the holes drilled for them, or they may be held by means of small metal pins.

The carbon heating elements are to be assembled together in the bottom of the earthenware cup so that there is $\frac{1}{16}$ in. between them, and holes to accommodate

out at the bottom, the seam should be silver-soldered, after the shell has been riveted in place, although brazing would be better. The heating element is then placed in position and insulated from the metal boiler with fiber disks, as indicated, a similar disk of soft rubber being used to prevent escape of steam or water. The top of the boiler is equipped with a steam valve, and the other necessary fittings, including a vent for filling the boiler, are brazed or riveted to the boiler shell. It

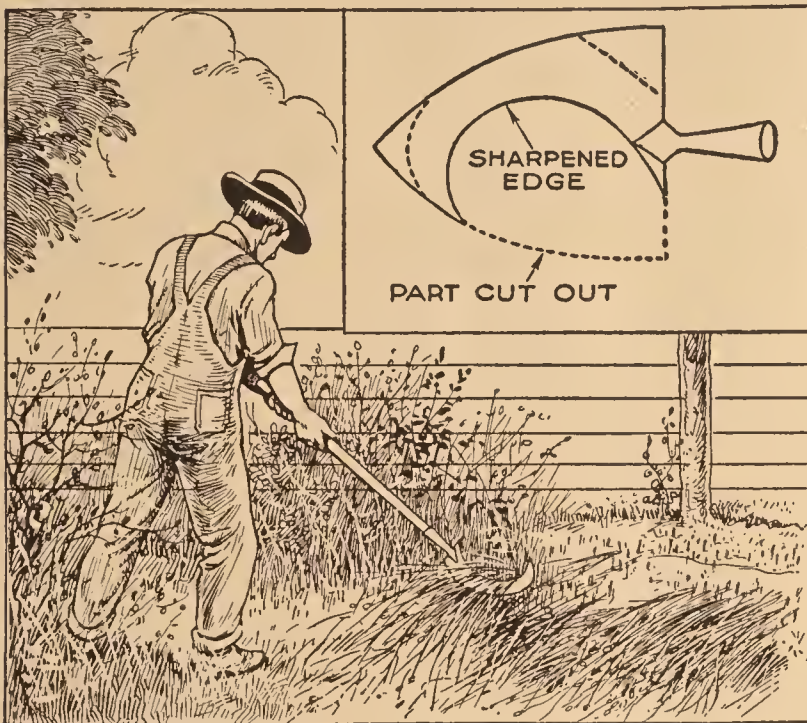
will be impossible to rivet this piece in place unless it is concaved or "dished," with a flange around the edge for the rivets. To simulate the appearance of fire underneath the boiler a colored miniature lamp may be mounted in the fire box as indicated, or by placing the light behind a fire door that has openings covered with red and orange glass.

The efficiency of such a boiler is quite

high; the water enters through the four open spaces in the bottom of the outer carbon and is heated as it ascends through the annular opening of the heating element. The water is heated to the boiling point by its own resistance to the passage of current through it. The fire danger that attends the usual alcohol lamp is eliminated, and if the boiler goes dry, the current is automatically shut off.

Brush Hook Made from a Shovel

The brush hook shown in the drawing has been successfully used for cutting away brush, in clearing land along fence



A Brush Hook Made from a Round-Nose Shovel That for Many Purposes Is Superior to the Ordinary Hook

lines, and similar work; it is made from a shovel of the round-nose type. The blade is cut away along the dotted lines, and the resulting sickle is sharpened. For many purposes a hook of this character will be found superior to the ordinary brush hook, as a better blow can be struck and the sickle-shaped blade makes it possible to handle several small shoots at the same time.—G. P. Melrose, Kamloops, B. C., Can.

Emergency Axle Repair

An automobile tourist saved the trouble and expense of being towed to the nearest garage, when one of the rear hubs of his machine became broken. He removed the hub from the wheel so that the end of the axle shaft was exposed. A pipe wrench was put on so as to grip the shaft, and the handle was tied to one of the spokes in the wheel, thus holding the wheel on and causing it to revolve with the axle.—S. S. Spence, Kearney, Neb.

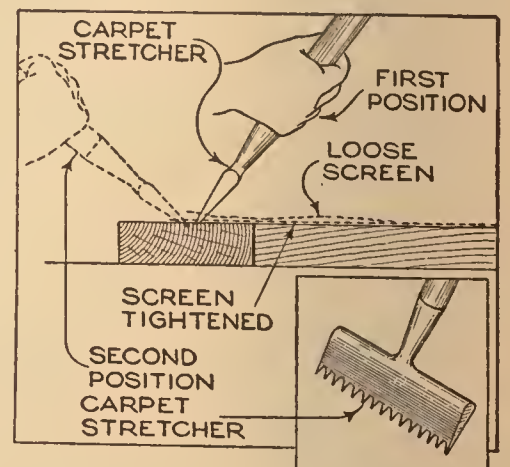
Repairing Eaves Troughs

Holes that are rusted through the eaves troughs of a building can be mended in a simple manner with ordinary cement, sand, and a little wire screen. A piece of the screen, a little larger than the hole to be cemented, is placed inside the trough to serve as a bond and reinforcement. This is coated with concrete made from equal parts of Portland cement and sand. This idea has also been applied to mending the chipped corners of greenhouse windows, in positions where the holes were difficult to reach from the outside, and the repair was found to be much better than putty; the rich concrete made a perfectly water-tight joint between the glass and the wood, which was thoroughly wetted before applying the concrete.—Ansley Hitz, Chicago, Ill.

Pulling Screen Wire Taut

Having to renew the screening on several large porch screens, I was at a loss to determine how the new screen wire could be drawn taut across the frames. In looking through the toolbox, I found an old carpet

stretcher which was tried out and found to answer the purpose in an ideal manner. To use the stretcher, the screen is fastened along one edge of the frame and the carpet stretcher inserted in the mesh on the opposite edge, drawing the screen wire taut. The stretcher was found to be particularly effective on the large frames, where it would have been practically impossible to stretch the wire evenly by any other method.—Harry G. Schultz, Teaneck, N. J.

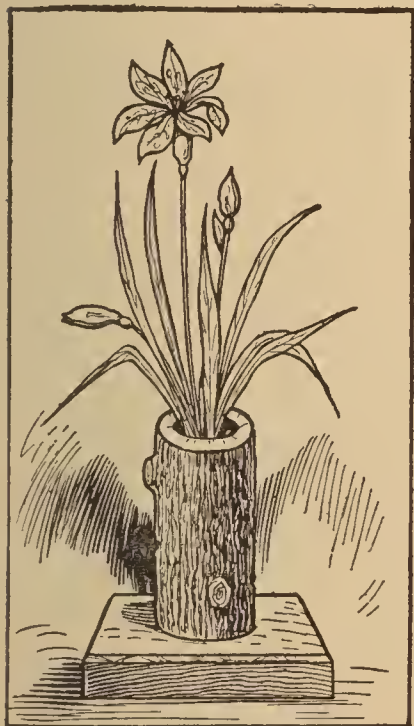


Trapping Rodents without Bait

By setting a spring rat or mousetrap in the usual manner, and placing it so that its trigger end will butt against the wall, it will be found that the animals may be caught without bait. The reason for this is that they usually run along the wall, and across the trap, and as soon as they strike the trigger, the trap is sprung. This method is particularly applicable in a room where there is so much other food that bait would not entice the rodents.—Thos. A. Dickinson, Youngstown, Ohio.

Rustic Flower Vases

A simple and effective flower container for the summer cottage or porch is made from a short length of a tree branch. The



bark gives a rustic appearance to the vase, and a variety of effects are obtainable by judicious selection, the white bark of the birch being the most conspicuous. The container may be made of any diameter by using a section of the desired size, from which the interior has been gouged or drilled out. A "liner," which is what florists call

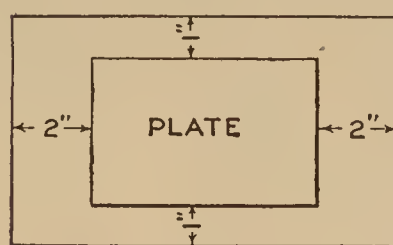
a container for water in such vases, may be provided by inserting a can, or other receptacle, into the hollow center.

Washers for Garden-Hose Connections

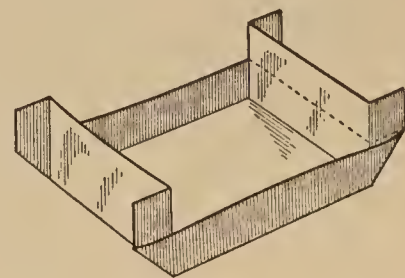
Having to use several lengths of garden hose connected together, it was found that much of the pressure at the nozzle was lost because the water escaped through the washerless connections. Looking about for something from which to make washers, it was found that the cork lining of the ordinary crown bottle cap just fitted into the usual hose coupling. The cork centers were removed from the caps, placed in the hose couplings, and the centers trimmed out with a sharp penknife. When connected together again, with the washers in the connections, leaking at the joints was entirely overcome.—C. E. Diehl, Mammoth, Utah.

Improved Developing Tray

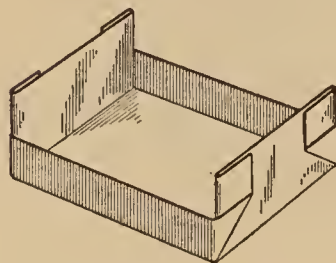
When a plate or two must be developed in a hurry, away from the dark room and its conveniences, a tray that will be suffi-



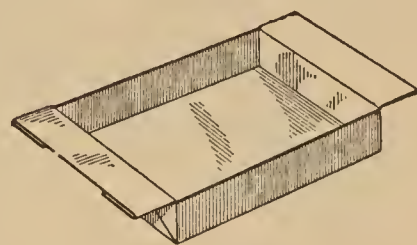
SHEET CUT TO SIZE



1ST. OPERATION



2ND. OPERATION



COMPLETED TRAY

When the Photographer Is Away from the Dark Room He can Develop His Plates in an Emergency Tray Made from a Sheet of Stout Paper, Waterproofing It with Paraffin

ciently satisfactory for emergency purposes can be made in a few minutes from a sheet of stiff paper.

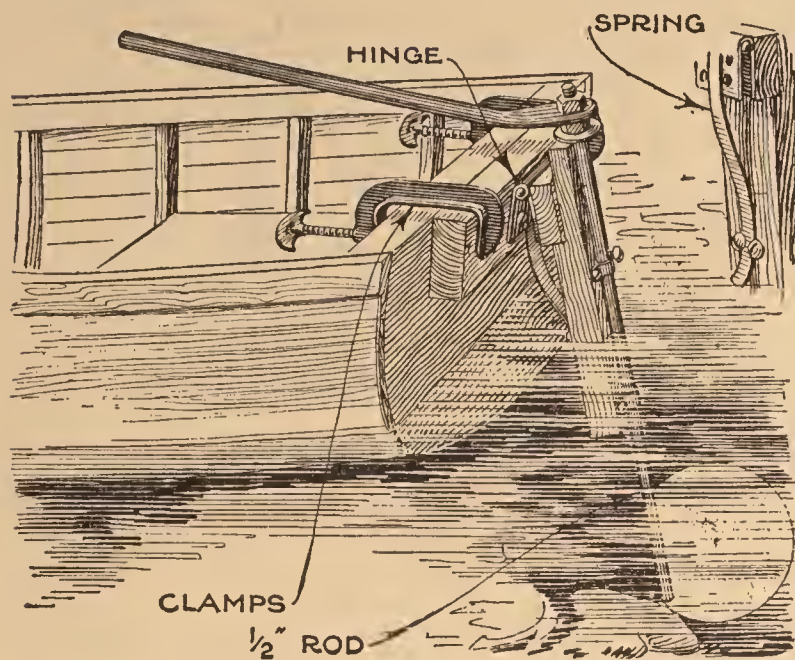
The sheet of paper to be used is measured so as to be 1 in. wider at the sides and 2 in. longer at each end than the plate. For example, if the tray is to hold a 5 by 7-in. plate, the paper should be not less than 7 by 11 in. Fold up the sides and ends as illustrated in the first operation. The second operation consists in turning the projecting ears back, and the third, turning the ends down to complete the tray. If convenient, the tray should be dipped in melted paraffin and allowed to cool, or a lump of the wax can be placed in the bottom of the tray and melted by gently heating over a stove or lamp. Do not use denatured alcohol or similar solvents in the waxed tray, as it will dissolve the paraffin and create trouble.—John H. Curtis, Philadelphia, Pa.

Sanitary Poultry-House Floor

The owner of a flock of chickens, on moving from one house to another, found that a piece of linoleum would not fit any of the rooms in the new home. This was trimmed to the dimensions of the chicken house and laid on the floor, producing a smooth, even surface and stopping up the numerous cracks in the board floor. The floor is kept covered with several inches of litter, and the linoleum has been found to make a durable, sanitary, and draft-proof floor.—Paul H. Reuss, Kalamazoo, Mich.

Boat Rudder for Shoal Water

In fitting a small rowboat with a sail, a removable rudder was desired, but, as this boat was to be used in shallow and



A Rudder for Use in Shallow and Weedy Waters That Swings Out of the Way When an Obstruction is Encountered: Two Ordinary Clamps are Used to Hold the Device to the Transom of the Boat

weedy water, the rudder as well as the leeboards had to be fitted so as to swing out of the way when an obstruction was encountered; this was accomplished in the manner illustrated.

The rudder blade, made of sheet metal, is riveted in a slot cut in the end of a $\frac{1}{2}$ -in. iron rod, the upper end of which is threaded and fitted with a tiller made of iron pipe. A piece of wood, about half as long as the $\frac{1}{2}$ -in. rod, is fastened at right angles to a small block, and the two joined to a third piece by means of a stout butt hinge, as shown, a piece of spring steel about 8 in. long being screwed underneath the hinge leaf fastened to the horizontal strip. The other end of the spring slides on the vertical stick, between guides formed by driving in a round-head screw on each side. The rudder is strapped to the vertical wooden member so as to swing freely, and prevented from dropping by a machine screw bearing against one of the straps; the horizontal member is fastened to the stern of the boat by means of two iron clamps as in the drawing.

A rudder of this type swings back when it strikes an obstruction, and as soon as this has been passed, the spring pulls the rudder back into place.—Walter E. Burton, Kenmore, Ohio.

¶ Silver-white or white lead, with yellow lake or Dutch pink, and a little lemon-chrome yellow, will give a very rich shade of olive-drab or amber color.

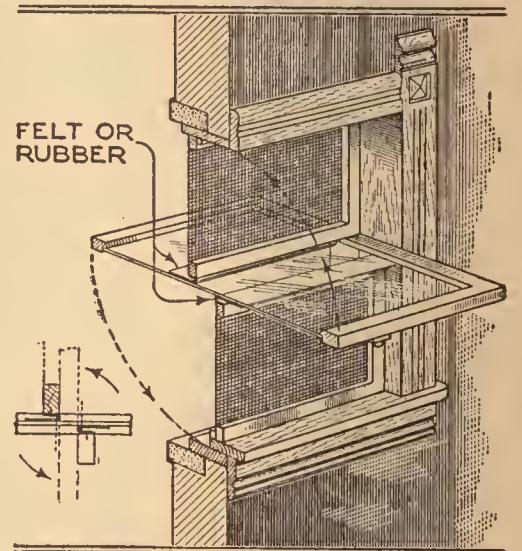
Filing Papers in Binders

Where office records were kept in post binders, it had been customary to indicate the contents by a label pasted on the top cover. Binders were then stored on shelves in stacks or rows, in which positions the labels were concealed, and considerable time was lost in locating the particular volume wanted. The only other space available for a label or an inscription was the bound end, which was too rough for writing or pasting. The uneven edges were cut down to an even surface with coarse sandpaper, followed by No. 0 sandpaper, the surface thus produced making it possible to write the title of the contents on it with a broad shading pen and ordinary ink. Under this plan, it became as easy to select any binder as to select a book by its title.—Waldemar Landry, Sr., Baton Rouge, La.

Screening Center-Pivoted Windows

One of the most perplexing problems, to many, is to put fly screens over a window that is pivoted at the center instead of sliding.

The difficulty may be overcome in the manner illustrated. The screen is made in two sections, each half the width of the window. One section is placed on the outside and the other on the inside, as shown, and a strip of felt or rubber, cut from an old inner tube, is tacked to the screen frames in such a manner that they will always bear against the window and close the opening.—J. R. Linton, Sioux City, Ia.



Indoor Trellis Made from Chain

An attractive trellis for a climbing asparagus fern can be made of brass picture chain. A chain is fastened to each side of the wooden pail in which the plant is growing, by a small hook, the other ends of the chains being looped over the curtain rod at the top of the window. Crosspieces of the chain are used to form a ladder effect.—Jo Walker Humphrey, Kirksville, Mo.



How to Make a Potato-Plant Sprayer

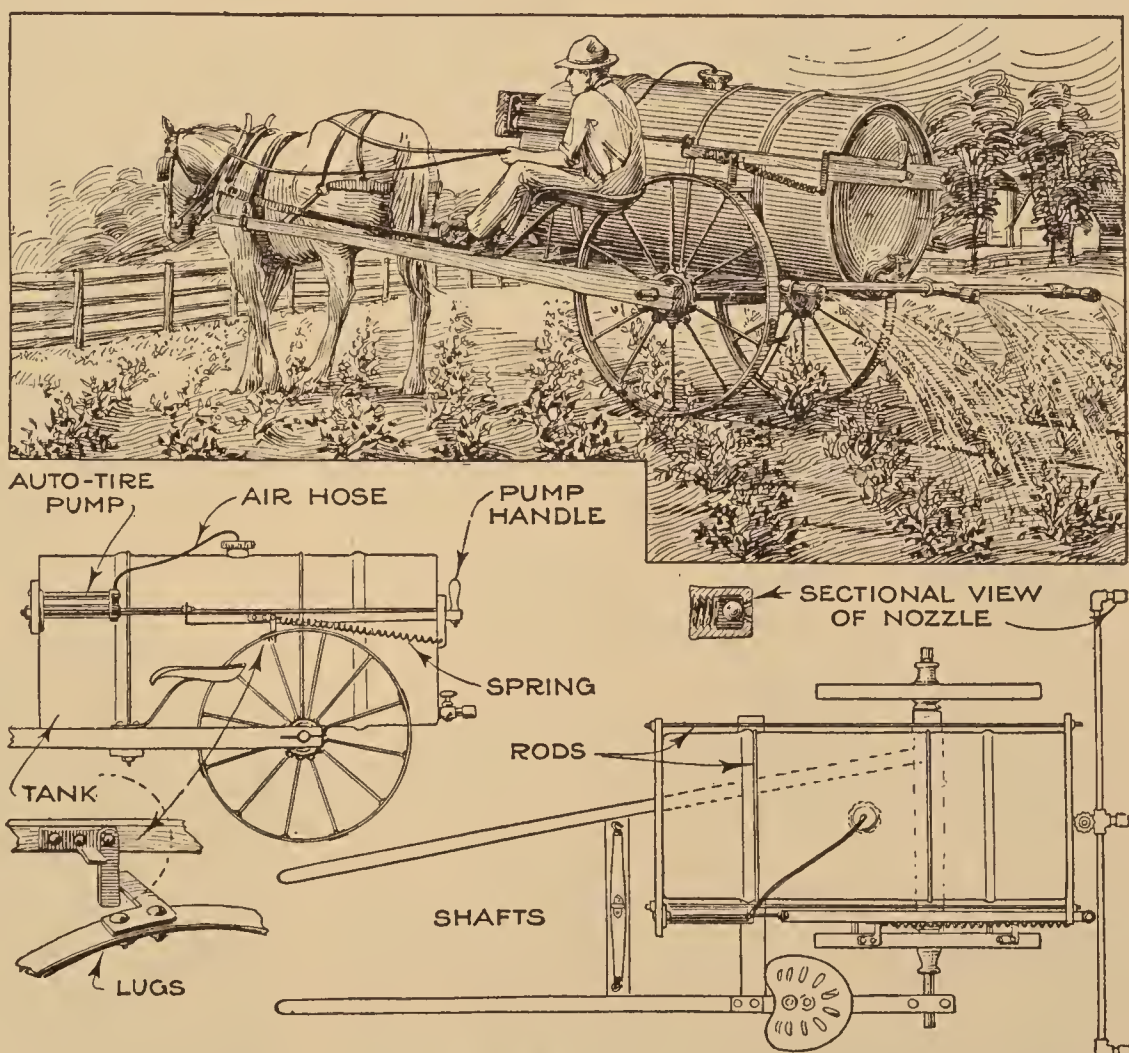
BY GEORGE G. MCVICKER

WHERE acres of potatoes are threatened with destruction by the potato beetle, it is entirely out of the question to combat the insects by the time-honored method of going along the rows and brushing them into a can, or cracking them between two stones, and spraying must be resorted to if the crop is to be saved. If the area planted with potatoes is small, a hand sprayer may be used, but for a large acreage the work is best done by a horse-drawn sprayer.

The homemade sprayer described in this article is made by mounting a suitable container, which may be a steel oil barrel, an old water tank, or something of a similar character, on wheels, and providing it with a pair of shafts, arranged so that the horse will walk between the rows, the wheels straddling the plants. The shafts are thus arranged by placing one shaft on the outside of one wheel and attaching that on the opposite side at an angle. The container is fastened to the frame by iron rods, bent to fit over the container, and threaded at the ends, which are passed through holes drilled in the frame cross members, then drawn up tight by nuts. To maintain the necessary air pressure in the tank for forcing out the spraying solution, a three-cylinder automobile-tire pump is attached to a piece of plank across the front end of the tank; this is held in place by long bolts passing through a similar plank at the rear. The plunger rod, which is fastened to the piston rod of the pump, is made from $\frac{1}{2}$

by 1-in. flat iron, with one end bent at right angles and a hole drilled through it for the piston rod of the pump. In the opposite end of the rod a hole is drilled, and a handle attached so that the pump can be operated by hand, if desired. This plunger may be made of hardwood.

Four projecting lugs are riveted to the wheel on the pump side of the sprayer. These lugs are so arranged as to engage



Spraying Potatoes with a Homemade Sprayer, to Protect the Crop from the Ravages of Its Insect Enemies: Air Pressure for Forcing the Spray through the Nozzles is Obtained by Means of a Tire Pump

with a short vertical arm riveted to the plunger rod and push it forward until the lug on the wheel slips off and allows a spring to return the plunger. If it is desired to prevent the pump from working when the device is on the road, the plunger-rod spring can be detached, or the lug on the plunger made as shown in the drawing. To connect the pump to

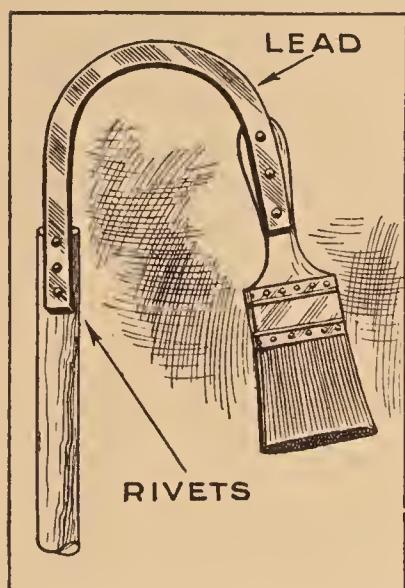
the tank, a hole is drilled in the cap, large enough for the stem of a tire valve to pass through, and this is held in place by lock-nuts and rubber washers.

The piping and nozzles are made from standard pipe and fittings, and the flow of spraying solution is regulated by a globe valve; separate valves may be added to regulate the flow of individual nozzles. The nozzles are made from ordinary pipe caps, in each of which two

$\frac{1}{16}$ -in. holes are drilled at an angle, as shown in the sectional view. In each cap a $\frac{5}{16}$ -in. brass ball, or a marble of the same size, is placed to make the solution form a spray. A seat for the driver can be mounted on the outboard shaft if this is desired. As the sprayer is jogged about the field, no agitator will be needed, in most cases, to prevent the heavy arsenical poisons commonly used from settling to the bottom.

Brush Removes Refuse from Gutters

When the eaves troughs become filled with leaves, and other litter and refuse, it is quite a task to clean them out. The



work is usually done by climbing a ladder and cleaning out the gutter for a few feet, then moving the ladder again and again until the work is complete. A simpler and safer method, since no ladder is required, consists in using the device illustrated. An ordinary brush is attached to one end of a bar of

heavy lead or solder, and the opposite end of the bar is fastened to a light pole of the proper length. When this is done, the lead or solder bar is bent so as to allow the brush to sweep the gutter, with the operator standing on the ground. Iron or steel can, of course, be used instead of the lead, if available.

Preventing Discoloration of Prints

Professional photographers rarely, if ever, have trouble with brown spots appearing on the prints in the fixing bath, because the prints are carried into the hypo solution free from developer. This is done by the use of an acetic-acid "check" or "stop" solution, in which the prints are immersed when they are removed from the developer, and before placing them into the hypo. This solution is made by adding commercial acetic acid to clean water, the proportions being immaterial except that enough acid should be used to neutralize completely the developer that remains on the print. The action of this acetic-acid bath is due to one of the most familiar chemical laws, namely, that an acid neutralizes an

alkali and vice versa. The developer is invariably an alkaline solution, while the stop is an acid, and consequently, if the latter is sufficiently strong, the alkaline developer will be neutralized and entirely removed from the print.

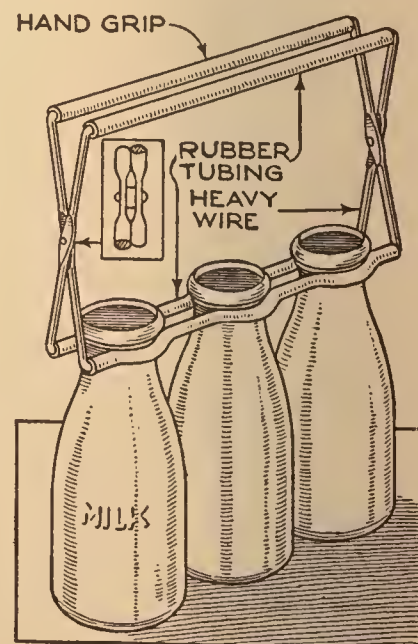
It is the introduction of prints into the hypo bath with developer on them that causes the dirty brown spots so frequently seen. Not only this, but unless the prints are completely immersed in the hypo, the exposed portion of the print will continue to develop. Remember that developer has no place in the fixing solution, and it is the oxidized developer in the latter that causes it to turn brown. By using the acetic-acid solution, and mixing up a fresh one from time to time, if a large number of prints are being developed, clean prints will be obtained, and the fixing bath can be used until completely exhausted. The acetic-acid solution is entirely harmless to the prints, and as it is cheap, a clean stop should be used for each batch of prints.

Handy Milk-Bottle Carrier

Milk deliverymen and others who have occasion to carry several bottles at a time will find the carrier shown in the drawing a great convenience

and timesaver. Two pieces of heavy-gauge wire or light iron rod are bent as shown, the horizontal parts being covered with rubber tubing. The joints where the ends of the rods meet are soldered, and the carrier is held together by a rivet at each end. By placing the bottles

on the ground and releasing the grip on the handles the bottles are instantly freed.

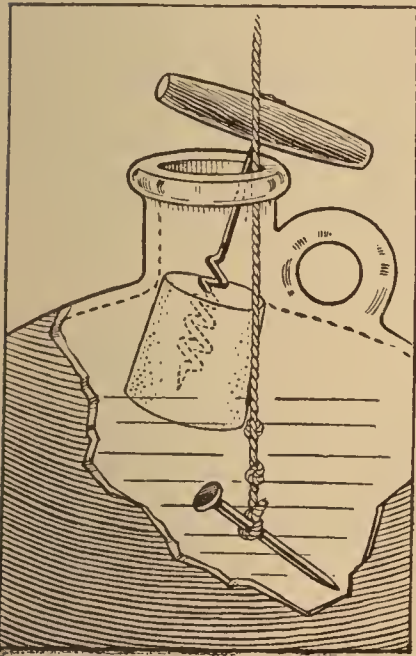


Testing Real and Artificial Silk

Real silk, when burned, smells like burning feathers, while artificial or "fiber" silk has the smell of burning wood. Another way of testing is to place a few threads from the sample into a test tube. The tube is heated and a piece of damp litmus paper held over the open end. If the sample is real silk, the paper will turn blue, but red if it is artificial.

Extracting Cork from Bottle

Corks that have been pushed past the neck inside a bottle or jug can be removed with comparative ease by a simple method. The vessel is filled with rather hot water, which softens the cork a little, and makes



it easier to pull out. Then a large-headed nail, tied on the end of a string, is dropped into the bottle and the cork is maneuvered so that the small end partly enters the neck. The string is then pulled up so that the head of the nail bears against the bottom of the cork and the other end against the

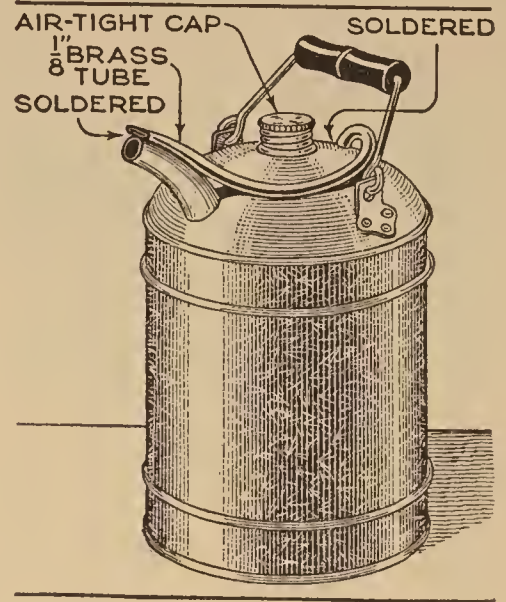
side of the vessel. It is now a simple matter to run a corkscrew into the cork, which is then easily extracted.—Arthur Nelson, Chicago, Ill.

Planting Dwarf Varieties of Beans

Dwarf or bush beans are generally the earliest and hardiest. In garden culture they are planted in rows about 18 in. apart, 2 in. deep, and 3 in. apart in the row; in field culture, in drills 2 to 3 ft. apart, so that a horse-drawn cultivator can be used. Until the blossoming period, frequent but shallow cultivation should be given. Seed of the larger varieties should be planted with the eye downward. Two pounds of seed will be sufficient for 100 hills of limas, and 250 to 300 hills of other varieties, and for about 100 ft. of drill; 1 bu. should be planted per acre. Beans should never be worked when they are wet from dew or rain, as this causes rust. Beans can be planted so as to obtain a succession in the crop until within about 60 days of frost.

Nonoverflowing Lamp Filler

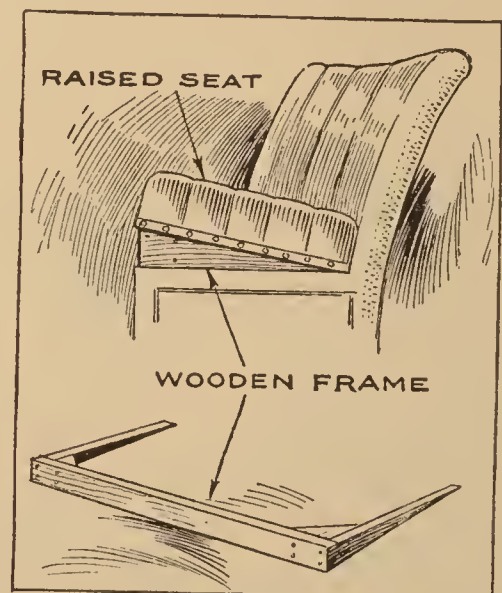
A length of brass tubing was fitted to the rear of the oilcan and the joint carefully soldered. The opposite end of the tube was then brought around and securely soldered to the spout in the manner shown, after flattening considerably the circular opening in the tube end. A leather washer was also placed underneath the



screw cap to make it air-tight. In using this can, the end of the spout is inserted into the filling hole of the oil reservoir of the lamp or stove for a short distance. As the oil runs out, air enters at the end of the tube, but as soon as the level of the oil rises to the end of the spout, the air supply is cut off and the flow of oil ceases, thus preventing the liquid from overflowing.—Dexter W. Allis, Whitman, Mass.

Making Auto Seat More Comfortable

An automobile seat that is nearly flat is not the most comfortable for long hours of steady driving, as the driver slides forward each time the car is stopped or its speed reduced. An upward tilt given to the front edge of the cushion overcomes this to a great extent, and makes riding somewhat less tiring. To tilt the seat, a

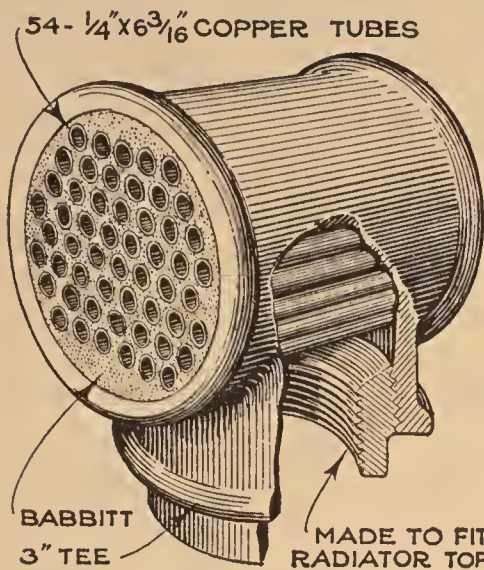


simple three-sided wooden frame is made and fitted underneath the cushion, as illustrated. The frame can be permanently attached with screws, if it does not interfere with the accessibility of tools or other accessories carried under the cushion.

☐ The farm bell will be heard farther if placed on top of the windmill tower.

Condenser for Auto Radiators

The efficiency of alcohol in the radiator of an automobile to prevent the cooling



water from freezing, depends entirely upon the quantity of alcohol present in the solution. Alcohol is quite volatile, and when the water becomes heated the alcohol quickly evaporates. However, if

some form of condenser is used, the alcohol, and also more or less of the steam from the water, will be condensed so that the loss will be prevented and the solution retain its cooling and antifreezing properties for a longer time.

The drawing shows such a condenser, made from a 3-in. pipe tee and some copper tubing. Two pasteboard templates, cut to fit into the ends of the tee, were made to hold the ends of the copper tubes in place. Then, melted babbitt was poured into the side opening in the tee, fastening the tubes securely in first one end and then the other. The device is made to fit the radiator-filler pipe, and should be placed pointing toward the front of the car, so that the cold air will pass through the condenser tubes when the car is in motion.—Frank N. Coakley, Buffalo, N. Y.

Standard and Summer Time Shown on the Same Dial

It has been the experience of residents in some communities that neighboring towns have set their time ahead an hour



during the summer months, while their own town did not. Naturally, the confusion under such a system is considerable, as those living in the separate communities must ever bear in mind two different time standards. A commuter found that by setting his watch to agree with the standard time in effect in his suburban town, he was continually being embarrassed by the conflicting daylight-saving time by which he did business in the city. In order to make his watch

indicate both times, he had an extra set of red numerals lettered on the dial of his watch, for the daylight-saving time. These may be printed on small stickers, and stuck to the crystal of the watch, if it is not desirable to letter them directly on the dial.—M. J. Rystrom, Rockford, Ill.

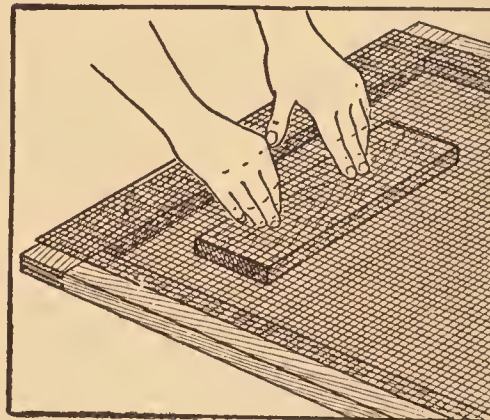
Tissue Paper as a Moth Preventive

A friend of mine keeps a uniform in a small closet, and, happening to be there at a time when the uniform was removed, I noted the absence of the usual moth-balls. Upon asking him about this, I was shown a small quantity of tissue paper scattered around the closet, and also how the moths had eaten a considerable portion of the paper, but had not attacked the clothing. My friend said that he had never known clothes that had been wrapped in tissue paper to be harmed by the insects, as it appeared they preferred the paper to the cloth.—Carl H. Kaufmann, Santa Ana, Calif.

Applying Screen Wire

Drawing up screen wire tightly and evenly on the frame, is usually a rather difficult job, even when considerable care is used.

A very simple method that permits the



screen to be drawn up tightly without leaving wrinkles and bulges, involves the use of nothing more complicated than a wooden block of about the

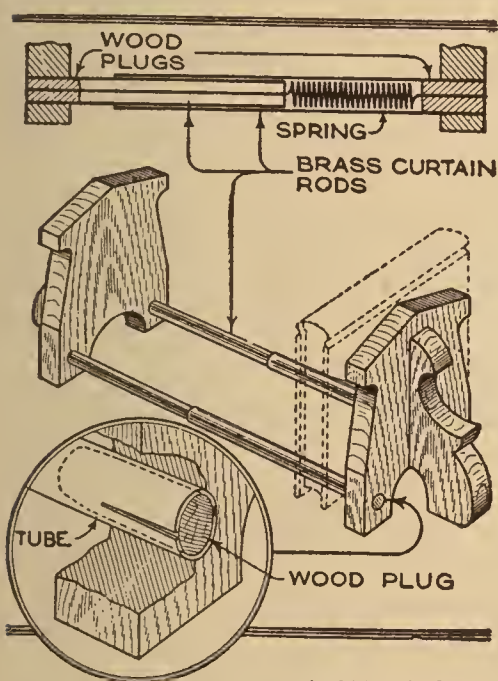
same thickness as the screen frame. One end of the screen is tacked to the frame, and the block is placed inside at the opposite end. The screen is laid down over the block, and, placing the thumbs of both hands on the side of the frame or at the edge, and with the rest of the fingers bearing down on the block, the latter is drawn back, pulling the wire with it. When the proper tension has been obtained, it is held with one hand while a tack is driven with the other; this operation is repeated as necessary until the wire has been applied. The screen should be laid on a table or other flat surface in order to provide a support for the block.

Cleaning Tarnished Silver

Tarnished silver may be cleaned by the so-called electrolytic method as follows: Place in a clean earthenware vessel, or an enamel one in which the enamel is unbroken, a solution of 1 teaspoonful of soda ash, or baking soda, and 1 teaspoonful of common salt, dissolved in 1 qt. of water. A sheet of aluminum or clean zinc is immersed in the solution, and the pieces to be cleaned are placed in contact with this; both the zinc or aluminum plate and the silverware to be cleaned should be completely covered by the solution. Heat nearly to boiling. When the tarnish disappears from the silver, rinse in cold water, and wipe with a soft cloth.

Self-Adjusting Book Ends

A convenient rack for holding the most commonly used books on the desk or



library table can be made from two pieces of hardwood which are cut to form supports or ends; these can be either plain or as ornamental as the taste and wood-working talent of the maker decide. Holes

are drilled in each, into which the ends of ordinary telescoping curtain rods are inserted. If there is any difficulty in getting the rods to fit tightly, the ends can be split with a hacksaw and wooden plugs driven in to expand the tubing. A short length of spring, having its ends secured to the opposite blocks inside of each rod, makes the fixture self-adjusting.

Rejuvenating Grass Rugs

Grass rugs are largely used on porches, and for rooms in summer homes, and give an atmosphere of coolness. Whenever such a rug becomes frayed and worn, it can be brightened up, and its life considerably prolonged, by cleaning it thoroughly and applying one or more coats of paint of any desired shade.—H. A. Norrell, Augusta, Ga.

Novel Apron for Kitchen or Shop

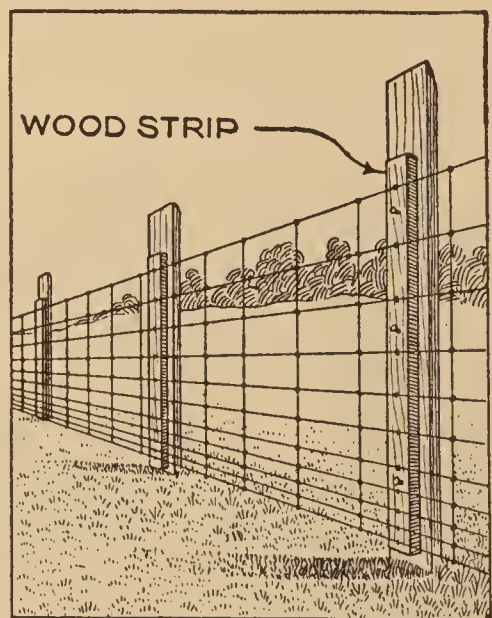
It is only necessary to add a few eyelets along the bottom edge of an ordinary apron to increase its convenience very materially for certain classes of work. In use, the eyelets are placed over a corresponding number of small hooks, screwed into the underside of a table or bench, while the apron is tied around



the waist in the usual fashion. The movements of the wearer are not in the least interfered with and she can sit or stand as desired. An apron of this kind will sometimes be found of service in factories and shops; in this case the apron may be fastened to the table or bench semipermanently, so that when the workers leave, it will be necessary only to untie the apron strings.

Facilitating Removal of Fence Posts

In most soils, wooden fence posts last but a few years, and in some localities, under particularly unfavorable conditions, their life is exceedingly short. Where woven-wire fence is used and attached to the posts with staples, a great deal of labor is necessary to pull the staples when a new post must be set, to take the place of one which has rotted off at the surface. If a piece of wood, about 1 by 3 in., is placed between the fencing and the post, and the staples driven into the strip, which is in turn fastened to the post with about three nails, the whole strip can be removed from the post easily, without in any way disturbing the staples, and without the hazard of breaking one or more strands of wire in attempting to remove them.



Homemade Pump for Shallow Wells

For pumping water from shallow wells, a simple wooden pump may be made, that costs practically nothing, and that is well worth the time spent in its construction. A square box is made, closed at each

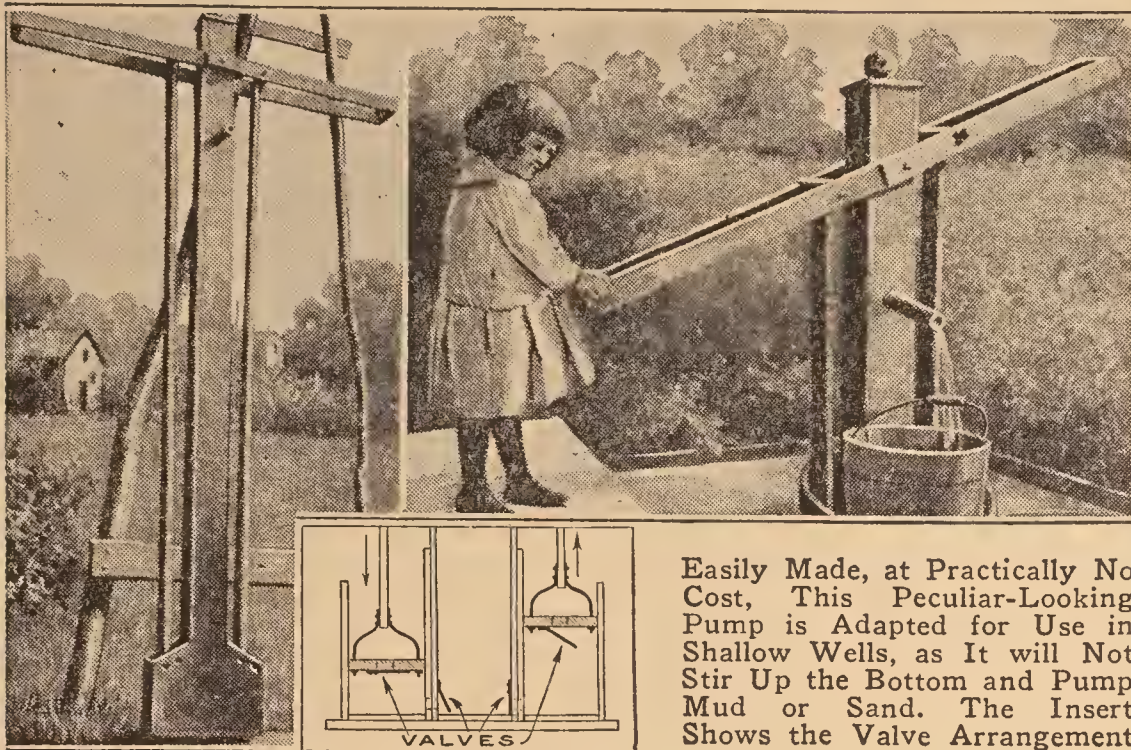
these sides of the box are built the two "cylinders," which are simply square open-top boxes, in height a little more than the stroke of the pump, but less than the depth of the water in the well; in these wooden blocks are fitted closely.

A hole is bored in the center of each block, and a leather flap valve, similar to the ones previously made, fitted to the underside. A hole is also bored in the side of each cylinder opposite the one in the long box. The arrangement of the valves is clearly shown in the insert.

Iron yokes are made and fitted to the blocks, to carry the pump rods, which are also of wood. These rods are pivoted to the pump handle.

One peculiar advantage of a pump of this character is that, owing to the fact that there is no

suction, the pump does not stir up mud or sand, in spite of the fact that it is set on the bottom of the well. This is so because the water flows over the tops of the cylinders. The water runs from the pump from a 2-in. spout which is placed at right angles to the handle.—Chester C. Cook, Chicago, Ill.



Easily Made, at Practically No Cost, This Peculiar-Looking Pump is Adapted for Use in Shallow Wells, as It will Not Stir Up the Bottom and Pump Mud or Sand. The Insert Shows the Valve Arrangement

end, long enough to reach the bottom of the well, and to project 3 or 4 ft. above the ground. On two opposite sides of this box, at the bottom, holes about 2 in. in diameter are bored, and over these flaps of flexible leather are fitted; these flaps are nailed above the holes, so that they hang downward over the latter. On

Nails as Campfire Irons

The camper usually finds it difficult to make a pile of stones around his campfire



that will support the cooking utensils and at the same time allow sufficient space for a fire, provided the rocks can be obtained at all. The uncertainty and annoyance of the former method can be overcome by carrying a few 80-penny spikes in the kit. These are merely pushed into the ground and support the cooking utensils without interfering with the fire. Spikes of the size mentioned are about 8 in. long.—Lloyd L. Stewart, Ames, Ia.

Soldering-Flux Containers

For the experimenter using small amounts of flux, there is no better container than one made from an old toothpaste tube. Open the crimped end of the tube with a pocketknife, and, using the blunt end of a pencil, restore the tube as nearly as possible to its original cylindrical shape. Clean out the interior with a toothbrush. Cut a section out of a clean lampwick, and place it in the nozzle of the tube to be used as a spreader and feeder of the flux. Fill the interior of the tube loosely with absorbent cotton; then make up a saturated solution of zinc chloride, by dissolving the chemical in water until no more will dissolve, fill the tube, recrimp the end, and the container is ready for use. A container of this type will operate even more successfully with a paste flux, in which case the cotton filling and the wick in the nozzle will not be needed and are, therefore, omitted.—Werner W. Baumeister, Cambridge, Massachusetts.

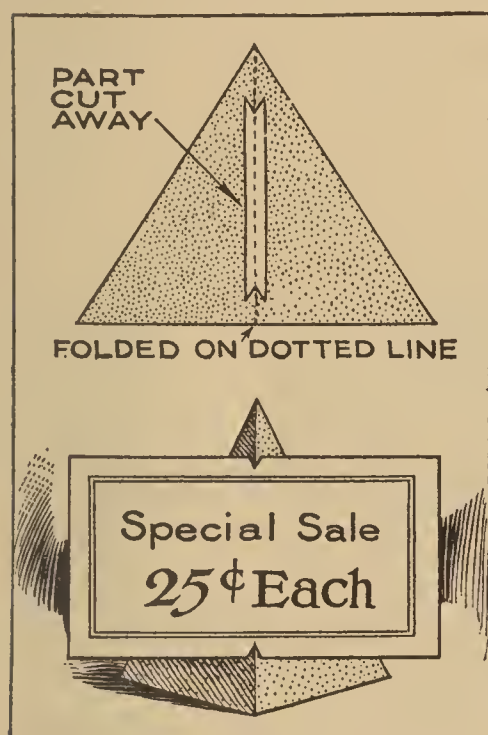
Protecting Trees from Insects

In summer, when it is desired that no ants, caterpillars, or other crawling insects, should climb the trees, some kind of a barrier is necessary.

The simplest, and one of the cheapest, methods is to place a wide band of cotton batting around the tree at some convenient height, fastening it to the tree with wire. The edges of the batting, protruding from underneath the wire, when fluffed, present an impassable barrier to any type of crawling insect or small animal, the cotton not affording a foothold for the latter.

Simple Price-Tag Holders

For holding display cards, and the like, securely, and in such a manner that they



are difficult to upset, a simple holder can be made of stiff paper or cardboard. The stock from which the holder is to be formed is cut into the shape of a triangle which is then folded along its center. A slot is cut out along the center, as shown, and

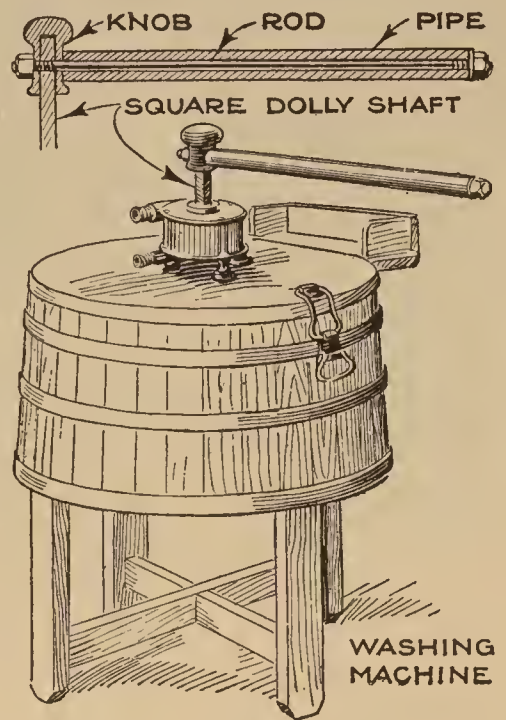
the triangular projections at each end of the slot serve to hold the card in place.—Frank N. Veloz, New York City.

Glossy Photographic Prints

To make photographic prints with the highest possible gloss, the first requirement is that the grade of paper known as "glossy" be used. After they have been printed, developed, fixed, and washed in the usual manner, they are squeegeed face down, on a sheet of plate glass, that has been previously polished with a little French chalk on a cloth. The advantage of glass over the metal ferrotype plates ordinarily used is that one can look through the former to make sure that the entire print is in contact, without air bells between print and glass. However, the enameled ferrotype plates are much lighter and will not break.

Emergency Washing-Machine Handle

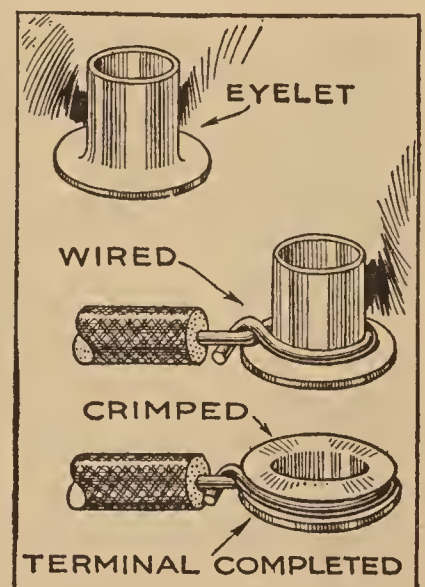
Many a housewife using a water-power washing machine is handicapped on wash day by low water pressure or a defective or worn-out motor. Also, it may happen that the water supply has been cut off for repairs to the mains, and there are other emergencies in which the operating handle shown in the drawing will be found of great convenience.



On machines of the type using a rotating-vane motor, the attachment of a suitable handle is a simple matter. The knob on top of the dolly shaft is usually held in place by a $\frac{1}{4}$ -in. screw through both shaft and knob; this screw is removed, and a long $\frac{1}{4}$ -in. stud run through the holes. A short section of $\frac{3}{8}$ -in. pipe is then slipped over the stud and clamped tightly in place with nuts and washers.

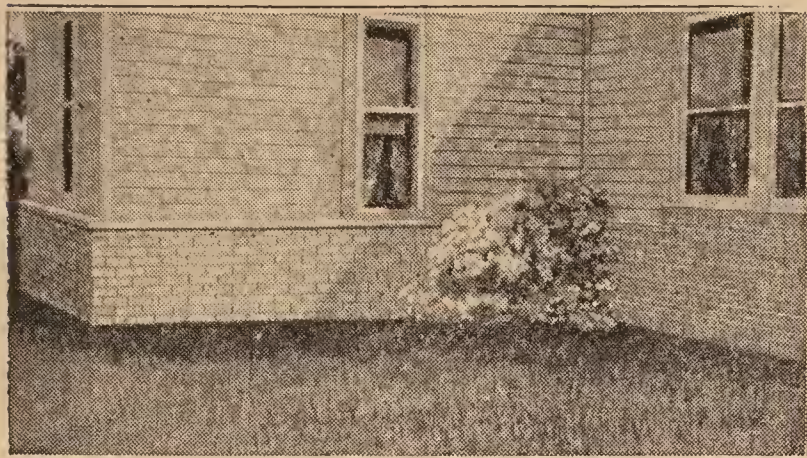
Wire Terminals Made from Eyelets

Practical terminals for electric wires that are held on bolt-and-nut binding posts, or for spark plugs, can be made by using the eyelets commonly obtainable at stationery stores for binding papers, and the hand punch used with them. To make such a terminal, the bare end of the wire is looped once around the eyelet, which is then crimped in the hand punch, pressing the metal down tightly against the wire and making a terminal that will fit neatly over the screw and give a good contact. If solder is used after crimping, a practically solid metal terminal is obtained that will give a minimum of trouble.



Concrete Wall Adds to Warmth of House

In seeking to modernize a dwelling by giving it the appearance of having a high foundation, the owner tried the experi-



Building a Low Cement Wall around a House to Improve Its Appearance: The Owner has Found That the Floors of the Dwelling Are Now Much Warmer in Winter Than Formerly

ment of applying a 2-in. thickness of solid cement directly over the original foundation and siding. In this way the cost of the improvement was kept at a lower figure than would have been the case had the house been raised and the foundation made higher.

The main precaution taken was to see that there was a firm bond between the foundation and the wooden siding. At first glance it might seem that water would drip down between the concrete and siding, thus starting rot and giving frost a chance to open up cracks. Nails were driven into the siding at the corners of 6-in. squares, with their heads protruding, up to the height of the projected auxiliary wall. The concrete foundation was thoroughly cleaned and given a thin wash of pure cement. Then the forms were made and the concrete poured. A mixture of one part cement to two parts sand was used. The top of the wall fitted underneath the edge of one of the siding boards and was finished by increasing the thickness to 3 in. and sloping it slightly away from the house to run off the water; the corners were reinforced with wire mesh. After the concrete had set for about 24 hours, the forms were removed, and the surface marked off in imitation of brickwork, the lines being cut by running the point of a spike along a straightedge.

Keeping Linoleum Fresh

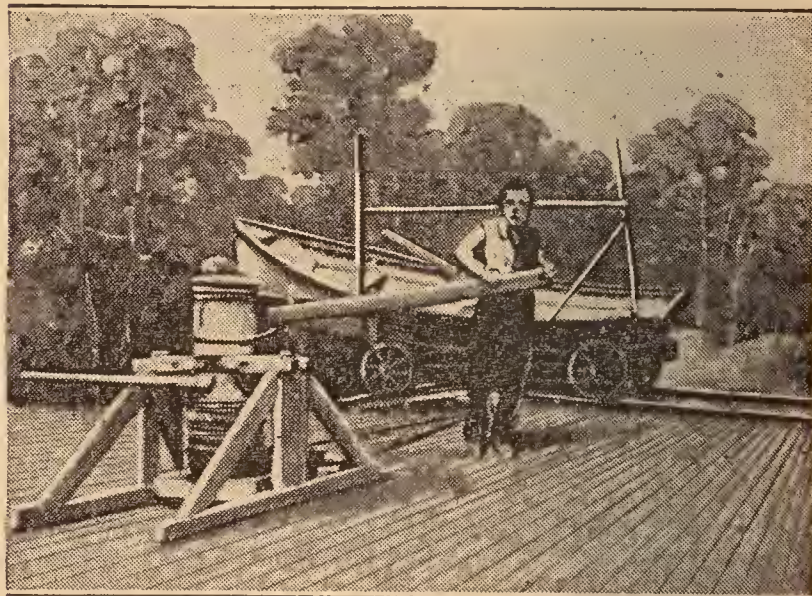
A mixture of equal parts of oil and turpentine, applied once a week, will keep linoleum looking fresh and clean. Palm oil, used alone, is also good; although not so good as the above mixture.

Poppies as Cut Flowers

Those who have undertaken to use Shirley or silk poppies as cut flowers are familiar with the shower of petals that follows cutting of the blossoms. Florists have a trick of preparing the poppies so that they can be used for cut-flower purposes. The bud of the poppy droops until it is ready to burst the green calyx that covers the flower, when it becomes erect. The flowers should be picked just before they shed this calyx, which is in two parts and splits at the bottom. The right moment for picking is when the calyx has split at the bottom just enough to show the color of the petals within. Cut the poppy at this stage, and gently pick off the green covering, place the crumpled-up bud in water, and the petals will open and will not fall off as they ordinarily do.

Hauling Boats from One Lake to Another

Faced with the alternative of digging a canal, buying two sets of equipment for



Hauling a Boat from One Lake to Another by a Miniature Marine Railway Is the Way a Body of Sportsmen Took to Avoid Digging a Canal to Connect Twin Lakes

use in twin lakes, or continue to carry their outfits from one to the other, a body of sportsmen solved the problem by means of a one-man marine railway.

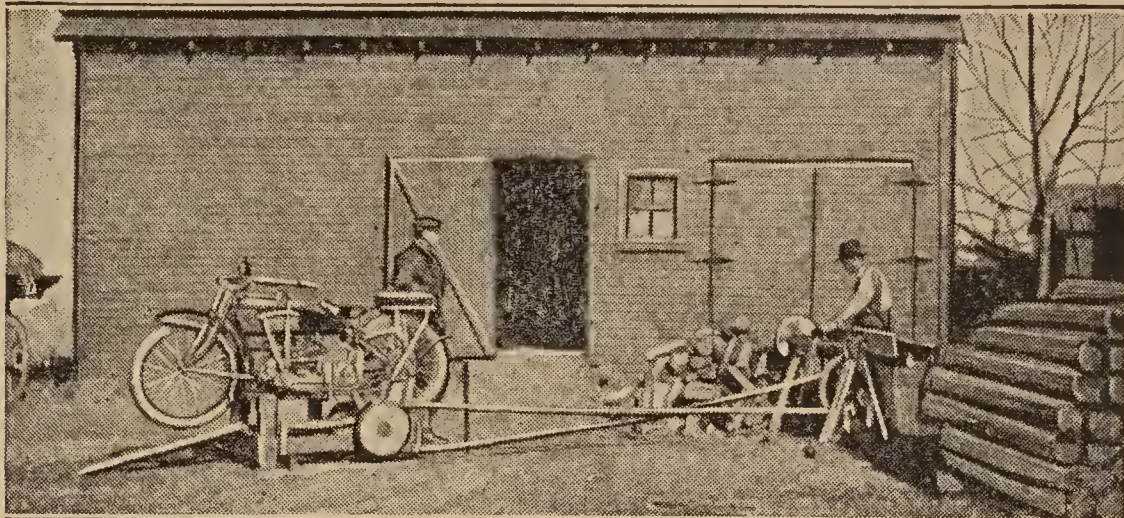
An incline leads to each lake and a homemade capstan, or windlass, was located at the highest point, so that boats could be pulled up from either side. A single car or cradle, fitted with flanged wheels, runs on tracks laid on the inclines. In operation, the track is rolled into the water, the boat floated into the cradle, and pulled up by means of the windlass. Too rapid progress down the incline on the other side is prevented by means of a rope and snubbing block.—L. J. Ellison, Dubuque, Ia.

Using a Motorcycle for Power

An Illinois farmer uses his motorcycle for running light machinery about his farm, and while not as convenient as a gasoline engine, it can be used where there is not enough work for a heavy engine, as in this case. Of course, the motorcycle engine cannot be run as steadily as a water-cooled engine, but is good for jobs where it can be stopped occasionally and allowed to cool.

The motorcycle is run up onto a wooden framework or platform, and when in use is supported by its stand, at the rear, and by a wooden crosspiece under the frame directly behind the front wheel; this latter is removable and is not inserted until the motorcycle is in place. A pulley shaft, which has a sprocket wheel attached to

it, is mounted on the frame, and after the motorcycle is in place, the chain is removed, shortened slightly, and reconnected around the sprocket on the shaft.



As There Is Not Enough Work to Require a Gasoline Engine, an Illinois Farmer Uses His Motorcycle to Furnish the Necessary Power for Grinding Feed, Cutting Up Firewood, and Other Light Jobs

A good-sized fan, driven by a belt from the shaft, and mounted so as to direct its breeze on the engine, is the simple means employed to prevent the engine from becoming overheated.—Charles Albert, Chicago, Ill.

Bridging Fuses

The fuse is the safety valve of the electrical system, put there for the protection of life and property. If a penny or a piece of wire is inserted when the fuse blows, that protection is removed, and the wires may grow red-hot, and even melt, thereby starting a fire in some concealed place, where it might not be discovered until too late to save the building. If a fuse blows, especially if it blows repeatedly, notify the lighting company, or a reputable electrician, and have any defects corrected. Fuses of standard make only should be used, if the utmost protection is to be given to the system.

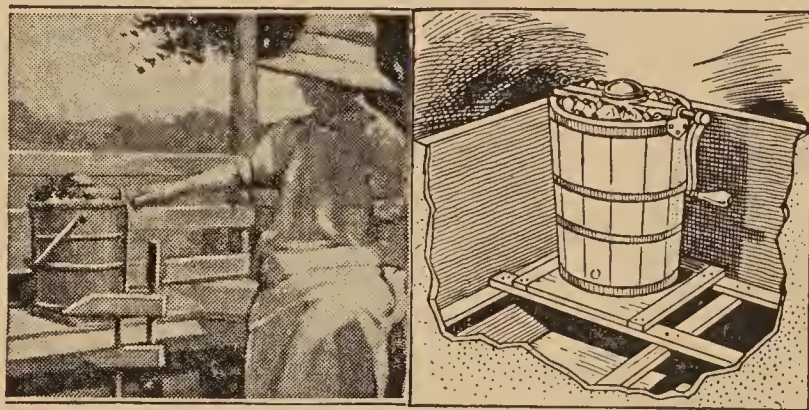
Clearing Stained Negatives

About as good a clearing bath as one can use for stained negatives—those that come out of the pyro-developing solution with too much yellow color—is made by dissolving 60 gr. or 1 dr. of powdered alum in 20 oz. of water, and adding 1 dr. of sulphuric acid. Immerse the negatives in this solution for a few minutes, remove, wash, and dry.

Reddish-looking spots with an irregular outline are caused by specks of iron in the water, and they will usually succumb to the sulphuric acid and water solution alone; this may be safely used twice as strong as indicated above.

Subduing the Ice-Cream Freezer

Two simple means of preventing the ice-cream freezer from moving with each revolution of the crank, by holding it to some solid support, are shown in the photograph and drawing. A piece of 1 by 8-in. board is nailed to the bottom of the bucket so that the ends project about 2 in. on either side. The freezer can then be

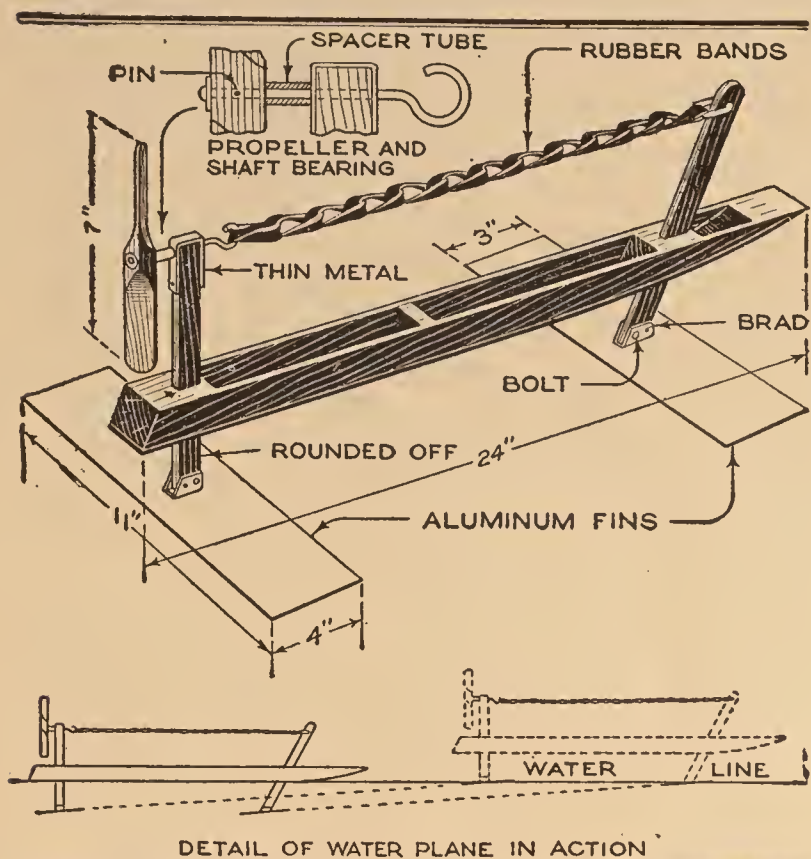


Two Methods of Holding the Ice-Cream Freezer Stationary: At the Left, a Board on the Bottom of the Freezer Allows It to be Clamped to a Solid Support; Right, the Wooden Frame inside a Laundry Tub

fastened with an ordinary clamp. The drawing at the right shows a frame set into a stationary laundry tub to bring the machine to a convenient height for operating. A movable frame was built to fit into the tub, and a piece of wood across the bottom of the freezer, as in the first example, rests between two cross strips on the frame and prevents the machine from moving.

A Toy Water Plane

The toy water plane shown in the drawing is something of a novelty in the way of model water craft, as the hull only



A Toy Water Plane That Rides on the Surface of the Water When Its Propeller is Revolving

rests upon the water when the propeller is not revolving. In traveling at full speed, the hull leaves the water quickly and rides with the fins on the surface of the water, as illustrated.

The sides and bottom of the hull are built up from strips of pine, about $\frac{1}{8}$ in. thick, blocks being used to space the sides the proper distance apart and for the attachment of the wooden supports for the propelling mechanism and fins. The sheet-aluminum planes, or fins, are mounted as shown, so that each is tilted at the same angle. The plane is driven by a model-airplane propeller, which, for a 24-in. water plane, should be about 7 in. long, and the power is derived from a motor made of a number of rubber bands linked together.—Donald W. Clark, Buffalo, N. Y.

Another Use for the Electric Fan

Electric fans of the oscillating type can be made to do double duty, as an advertising feature of a window display. This is done by attaching a circle of wallboard or light wood around the outside of the wire fan guard. Suitable advertising matter is painted on this, or small light articles, such as combs, pocketknives, and the like, can be attached without interfering with the ordinary operation of the fan.

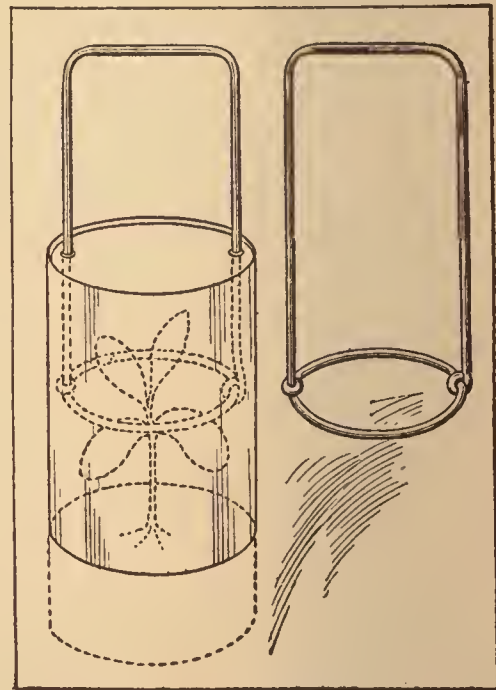
Using Auto Battery as B-Battery

Knowing the inefficiency and weakness of the ordinary radio B-battery, and that the performance of the radio set depends largely upon this battery, an operator devised a method for tapping the 12-volt storage batteries of a truck and car that are housed in a near-by garage. Two sets of wires are run from the radio set to the garage, each set terminating, at the garage end, in a plug that will fit in the dash-lamp socket on the car and truck. The house ends of the wires are connected to the set in place of the B-battery. When the two motors are brought in in the evening, the dash bulbs are removed and the wires plugged in. This arrangement gives a 24-volt B-battery of great power. A rheostat is used to step down the voltage to that found to be the most efficient for the particular type of vacuum tube used. The amount of current drawn from the storage batteries is, of course, restored the next day, when the motors are running.—Philip A. Wall, Bedford, Massachusetts.

A Tool for Transplanting

When transplanting small plants, a simple device made from a tin can and a bit of stiff wire will save considerable work.

One of the ends of a can is melted or cut off square, so as to provide a cutting edge; two holes are punched through the opposite end and a U-shaped piece of wire is inserted, after which the wire ring is attached to the ends, as indicated.



In use, the tool is placed over the plant and the can pushed into the ground for a sufficient depth, the plant and a quantity of earth being withdrawn inside the can when it is pulled from the ground. The plants are transplanted into holes, made in the same manner, by holding the roots and earth surrounding them down with the wire loop with one hand and withdrawing the can with the other.

Making Lead Doll-House Furniture

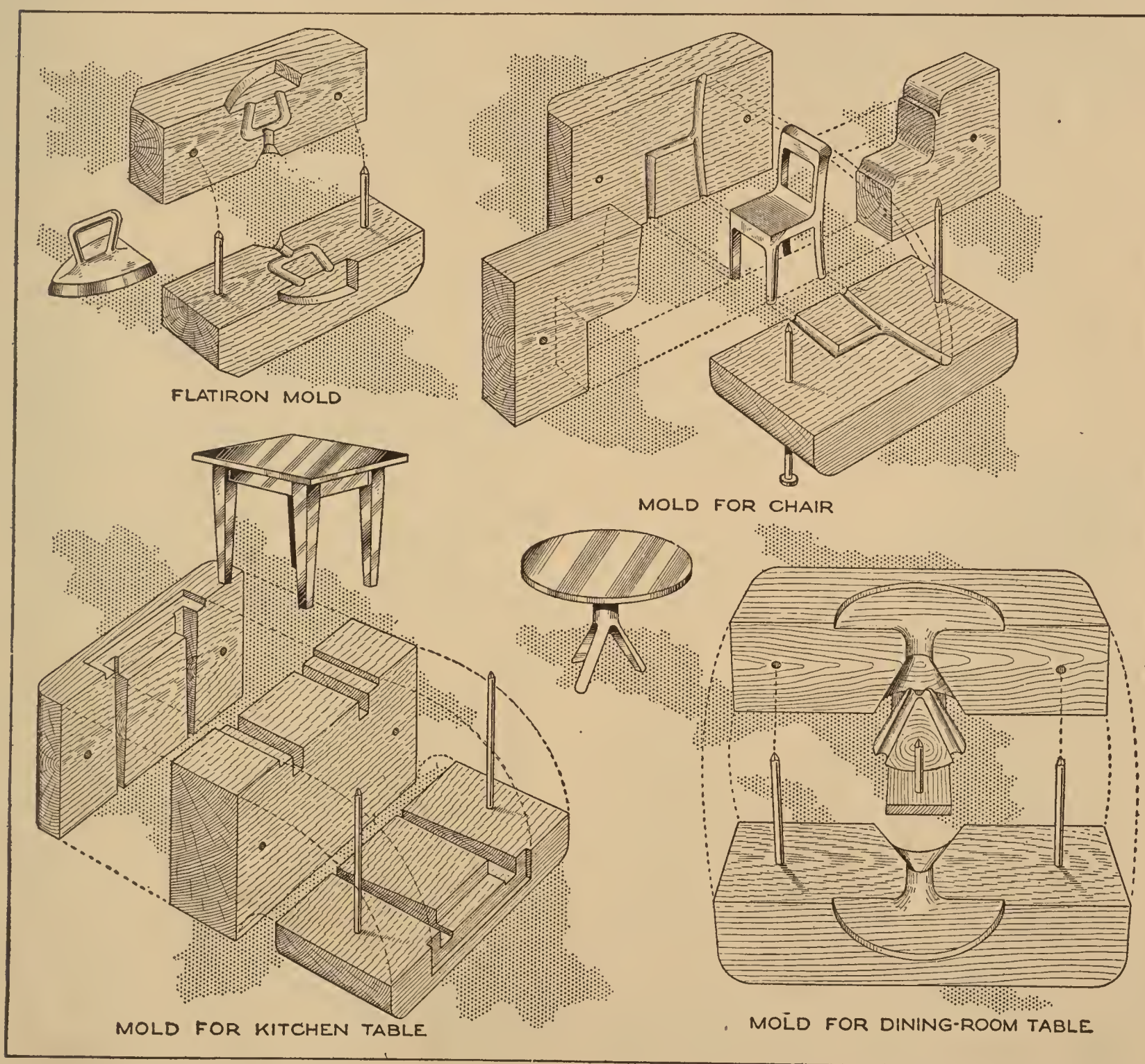
By E. H. TINGLEY

THE ease with which soft wood may be worked with simple tools, and the low melting temperature of soft lead, make an ideal combination for the boy who desires to produce metal toys. The tools required are a small plane, hammer, chisel, knife, and a ladle for lead. The lead can be obtained from any plumber, by asking for the short pieces of lead pipe to be found in the scrap pile.

For the mold, any soft wood, free from knots, may be used. Blocks, of a size suitable for the toy to be made, are planed square on all faces. The blocks forming each half of the mold should be planed

rated, and the design of the toy to be made drawn on the inner face of each block. Care should be taken that the design on each block will register with the other; that is, that they will come exactly opposite each other when the mold is closed. This may be accomplished by drawing reference lines across the top and ends of the blocks, when clamped together, separating the blocks, and drawing the lines across the faces.

When cutting out the molds, care must be taken to slope the sides of the cuts outward, giving them "draft," as a pattern-maker would say, so as to allow the pieces



Simple Molds for Making Lead Toys That can be Made by Any Boy with a Few Simple Tools: Scrap Lead Pipe, Obtainable from Any Plumber, Is the Material Used, and, with a Little Care in Making the Molds and Subsequent Trimming, Very Good-Looking Toys are Produced

to the same size, then clamped together, and holes, a little smaller than the diameter of the wire nails used as dowels, drilled clear through both, as shown in the drawings. The blocks are then sepa-

to be withdrawn from the molds without sticking. In making molds for tables, the tops should not be made too large or thick, as these molds are poured, top down, through the legs, and the lead will

not remain liquid long enough to run through the leg to the farthest corner of a large top. The parts of the toy must

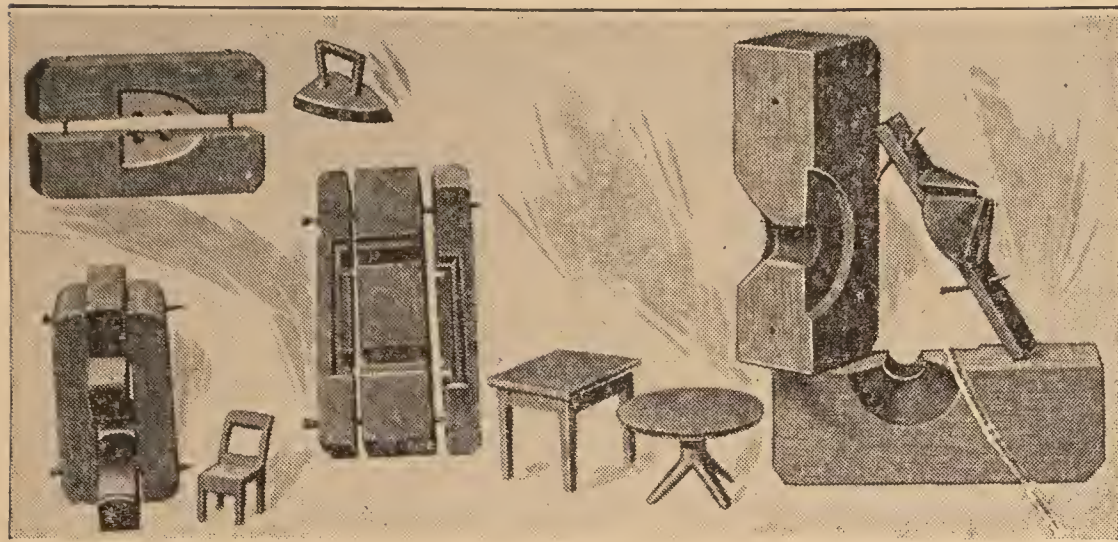
casting. The molds should be held firmly together and down on the stove lid while pouring. It is necessary that a warm

metal surface, such as the heated stove lid, be used as a base, else the lead will chill and spoil the work.

Lead remelted too often is not satisfactory for very small toys, as it becomes hard and brittle with repeated melting. The softer the lead, the easier it is to trim with a knife, to produce good-looking toys.

Other toys than those illustrated can be made

by clever boys; dumb-bells, rocking-chairs, water pitchers, tenpins, etc., can be successfully produced. The method of making the molds is clearly shown in the drawings and photograph.

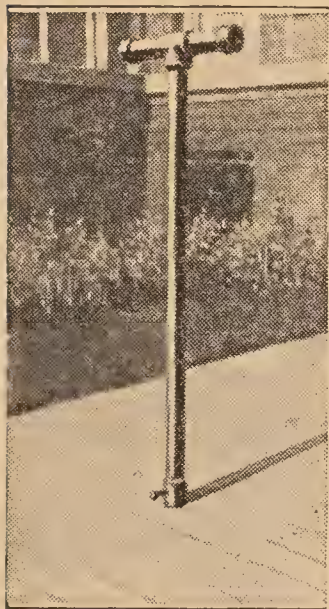


Molds Used for the Flatiron, Kitchen and Dining-Room Tables and Chair, and Samples of the Toys Cast in Them

be proportioned with this in mind, and the lead kept hot, to secure good castings. The lead can be melted over the gas flame of the kitchen range, and a stove lid, heated fairly hot, used as a base for

Vehicle Gate for a Driveway

The object shown in the photograph has not the appearance of the conventional gate, yet, set up in the middle of a private driveway, as shown, it prevents the passage of vehicles, but allows unobstructed access to pedestrians.



A 4-ft. length of 2-in. pipe, with horizontally projecting arms formed of pipe and fittings, rests in a socket imbedded in the cement driveway. A setscrew holds the "gate" tight. When a vehicle is to pass, the setscrew is loosened, the pipe is lifted out, and replaced when the

automobile or carriage has passed.—Curtis Ralston, Chicago, Ill.

Driving Hornets from Nest

Hornets had built a nest in the eaves of a small garage, and their presence being undesirable, various means were tried to evict the potentially dangerous insects. A small plunger-type oil gun was filled with kerosene, and this was squirted onto the nest from a safe distance. The following day the nest had been completely evacuated.

The Care of Kerosene Lamps

Poor light is often caused by the condition of the lamps and wicks. The heavy oils that accumulate in the lamp should be thrown out every month, and the lamp thoroughly cleaned. Water should not be put in the lamp, nor should the wick be permitted to become damp. The lamp should be filled and cleaned, and the charred portion of the wick removed each time before lighting. Oil feeds to the wick better from a full lamp, and there is less danger of gas being formed in the lamp bowl. The wick is the vital part of the lamp, so it should be of good quality, of proper size, and long enough to reach to the bottom of the oil fount. New wicks should be supplied every month or two. They should be dried before the fire and put into the oil while still warm. Wicks clog gradually—clogged wicks make poor light; hence, economy in wicks is poor economy. A smoky flame may be due to a cheap burner, or to an unsuitable chimney. Burner and chimney should be kept clean. Burners may be cleaned by boiling with water to which a little soda has been added. Bad odors are almost always caused by heating and resulting evaporation of the oil on the outside of a dirty lamp or burner.

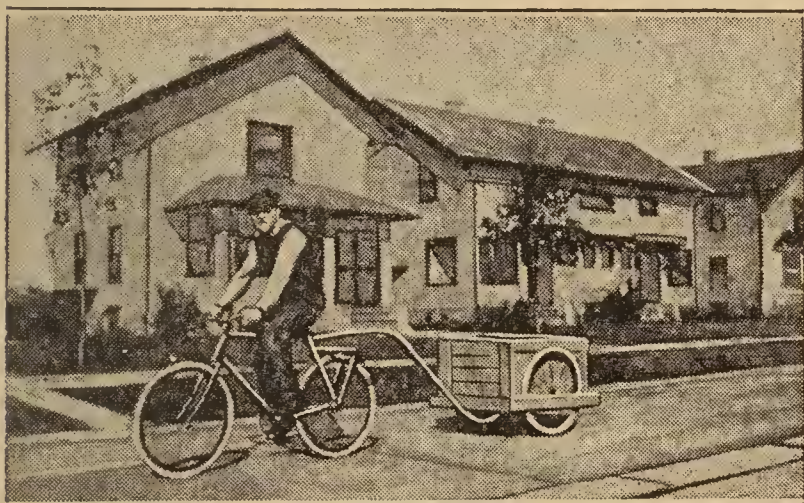
Kerosene dissolves various substances with which it comes into contact. These dissolved substances clog the wick, and the least water or moisture will make the

oil worthless. Keep the oil can clean and dry. Good oil is sparkingly clear and brilliant.

So-called "safety powders," that are sold under the claim that they make the light brighter or prevent explosions, do not increase either the safety or illuminating power of the oil, and more than likely do positive harm by clogging the wick. They are usually sold with positive instructions to use clean oil, keep the lamp and wick clean, and the oil chamber full. If these instructions are followed, the result is a bright and safe flame, but the same result would be obtained by following the instructions—and throwing the powder away.

A Trailer for the Bicycle

Cultivating a three-acre garden tract six miles from home, the gardener built the bicycle trailer shown in the illustration to carry his tools and produce back and forth. The box body is a large wooden packing case mounted on a pair of stand-



A Bicycle Trailer, Built to Carry the Tools and Produce of an Amateur Gardener over the Six Miles between Home and Garden, has been Found Just as Useful When the Growing Season Is at an End

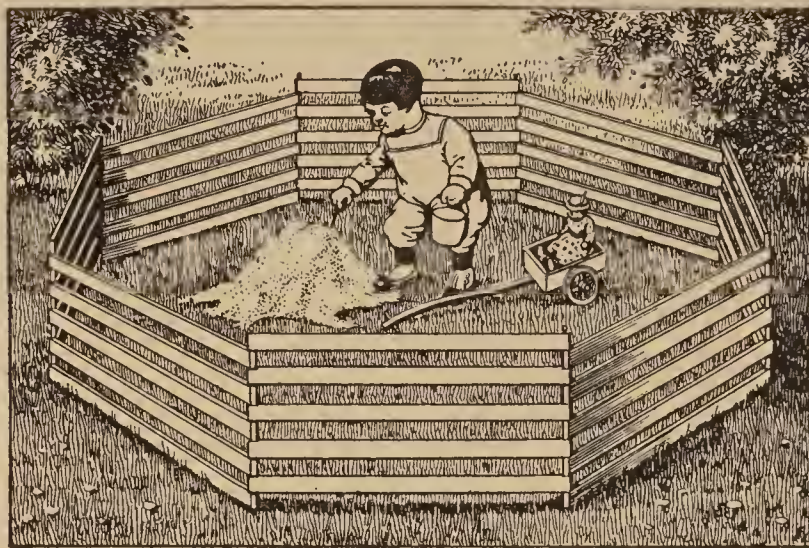
ard bicycle wheels. A 10-ft. length of pipe forms the connecting link with the cycle. After the growing season had come to a close, the owner used his trailer for hauling chicken feed, groceries, and similar loads.—Uri V. Averitt, Gary, Ind.

Testing Wool or Silk Goods

If a piece of goods that has been sold for all wool or genuine silk is suspected of being mixed with cotton or linen, the truth can be found by boiling a sample of the material in a five-per-cent solution of caustic soda for about five minutes. This treatment will boil out any silk or wool and leave the cotton or linen unchanged, if any is present. By weighing the sample before and after testing, the extent of the adulteration can be found.

A Simple Play Pen

A busy mother desired her baby to play out of doors as much as possible, but at the same time wished to restrain the

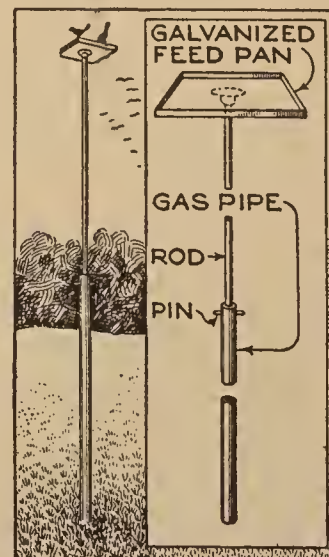


A Simple Form of Inclosure That Restricts the Movements of Its Juvenile Occupant is Made of Fruit and Vegetable Crates of a Familiar Type

movements of the child so that it would not wander off into possible danger. Being unable to keep a constant watch over the child, she evolved the simple form of inclosure illustrated. Certain fruits and vegetables are packed in crates made of a number of strips of wood joined together at the corners by lengths of heavy wire, passed through holes in the ends of the strips. Several of these crates were obtained and dismantled, then linked together at the ends to form a fairly large inclosure, which, when not in use, can be folded to occupy a small space.—Harry G. Schultz, Teaneck, N. J.

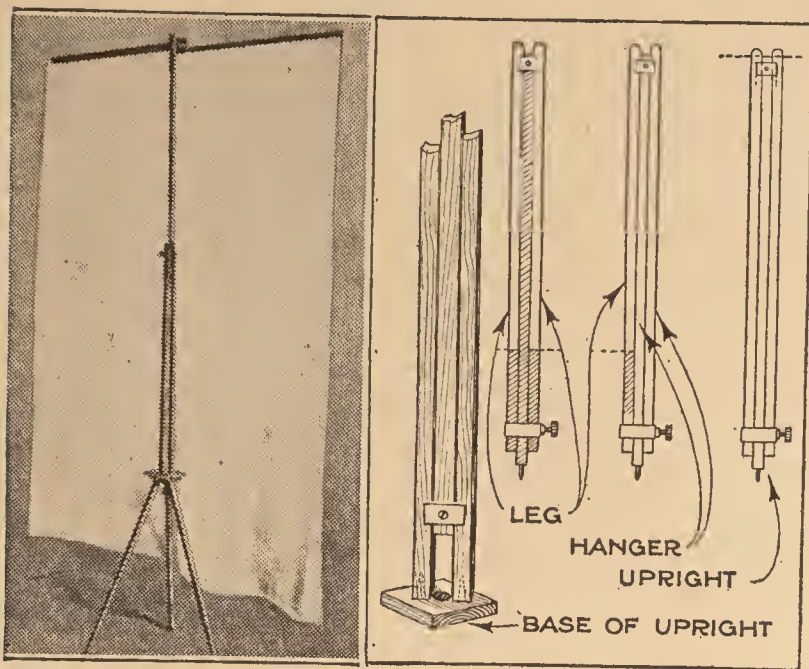
Feeding Tray for Birds

At several points about his thickly shrubbed and forested yard, a western business man and nature lover has installed feeding trays for his bird guests that remove them from the danger of cats, dogs, and other molesters. Lengths of pipe are set into the ground, and the galvanized-iron feeding trays are fitted to rods sliding in these. When the tray is to be filled, it is lowered, and when it is to be raised so that the birds may eat in safety, the rod is slid upward and a pin is inserted through a hole in the pipe, underneath the lower end of the rod.—Chas. A. Goddard, Los Angeles, Calif.



A Cheap Reflector for Home Photography

Good indoor portrait photography is impossible without a reflector, and a good one generally costs more than the aver-



A Reflector and Support That can be Made from an Old Camera Tripod will Equalize the Illumination and Reduce the Violent Contrasts of Light and Shadow

age amateur cares to pay. However, a very serviceable article can be made from the legs of an old camera tripod.

One of the old legs is sawed off to produce three pieces of equal length, about $1\frac{1}{2}$ ft. long, and these are hinged to the tripod head to make a short tripod. The screws that hold these legs should be screwed down tightly so that the legs will stay in the position in which they are placed. The upright is made from another of the tripod legs, and this requires no alteration other than squaring the rounded ends. A square block of wood, about $\frac{1}{2}$ in. thick, is screwed to the ends of this section to form a base. Between the two legs, a tripod socket from an old camera is imbedded in the block. This section, in use, is screwed to the top of the short tripod. For the horizontal hanger, from which the cloth reflector is suspended, the third section of the tripod has a short piece cut out of one of the side members. By loosening the setscrew, the hanger can be extended to about 3 ft. A loop of wire or cord should be fastened near the setscrew for hanging to the upright.

A piece of white cloth, about 3 by 5 ft., is used for the reflector, and a small pocket is sewed into each of the upper corners to slip over the ends of the hanger.

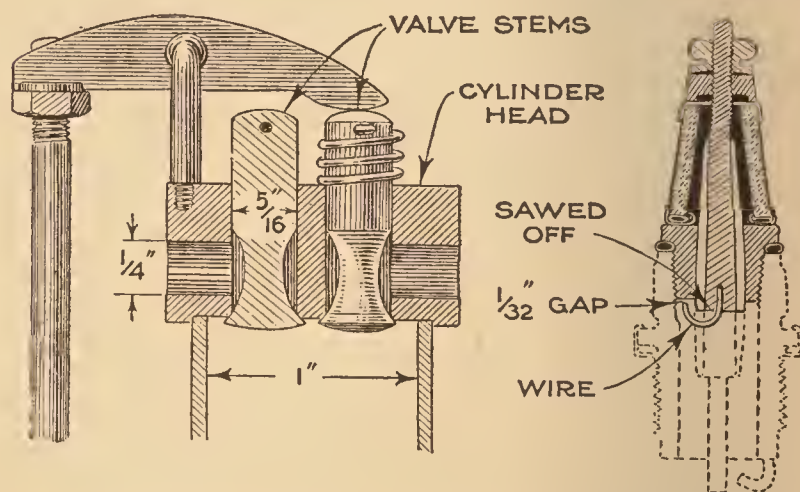
☐ Blotting paper glued to the bottom of bric-à-brac prevents scratching polished mantels and sideboards.

Protecting Fruit Trees from Frost

Much of last year's fruit shortage, especially in the midwest and northern states, was due to the fact that the trees came into blossom earlier than usual, and were damaged by late-spring frosts. The method used by one fruit grower to avoid such a happening is worthy of note. While the ground in his orchard was frozen to a depth of several feet, he hauled the refuse from his barnyard and hayloft out, and spread it upon the ground under the trees, to a depth of 5 or 6 in. When the warm days of early spring followed, bringing neighboring orchards into blossom, his own orchard was as bare as it had been in the depth of winter. The heavy mulch of leaves and straw had held the frost underground, preventing the trees from budding. As soon as he was assured that all danger from frost was past, he removed the protecting mulch, and the trees came into blossom just late enough to miss the frost which destroyed the crops of other growers in his locality.

Hints for the Model Gas-Engine Builder

The maker of model gas engines is generally "up against it" when it comes to making valves in proportion to the size of



Simple Valves That will Operate Efficiently in a Model Gas Engine, and a Small Spark Plug That can be Made from Any of the Various Types of Separable Plug

the engine; also in trying to buy spark plugs of a corresponding scale on the market. A $\frac{1}{4}$ -in. valve, made in the proportions of the regular ones, would have a stem too thin for practical purposes, and, in addition, would be difficult to turn on the lathe. One way out of the difficulty is shown in the drawing; the valve stem was turned to $\frac{5}{16}$ in., for a 1-in. cylinder, and then cut away back of the head to make a passage for the gases, leaving a strong, durable valve. This makes it easy to machine the cylinder head, as it is only necessary to make seats for the valve

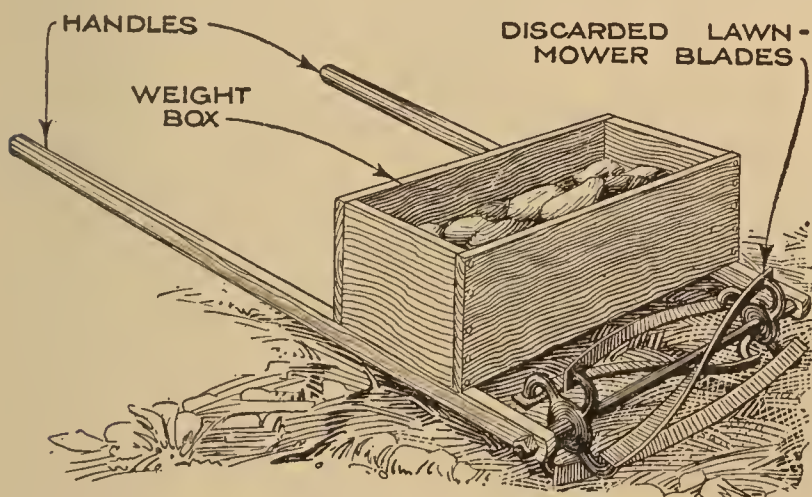
heads. The ports are drilled from the side, as shown.

There are several types of mica spark plugs on the market that are made separable to facilitate cleaning. Part of one of these may be used to make a neat plug for the model. The two parts of the plug are separated, and the long central electrode, or point, is sawed off at the point indicated, then drilled, and a piece of wire driven into the hole; this is bent to form a gap between it and the portion that screws into the cylinder. A gap of $\frac{1}{32}$ in. is sufficient. The miniature cylinder head is then drilled and tapped in the most suitable place to take the spark plug.—Edwin J. Bachman, Fullerton, Pa.

A Novel and Effective Garden Mulcher

Because a garden plot is free of weeds, it does not necessarily follow that it is sufficiently cultivated; if the soil becomes hard, packed by the rain, and baked by the sun, the vegetables or flowers will not thrive. Consequently it is absolutely necessary that the top soil be kept loose if the plants are to develop in the manner they should.

For this purpose a revolving mulcher, made from the cutter reel of a discarded lawn mower, will be found better and easier to operate than a hoe. Make a pair of handles from strong material, and mount the cutter reel across the ends of the handles. Just back of the handles a box is made to hold as many stones or

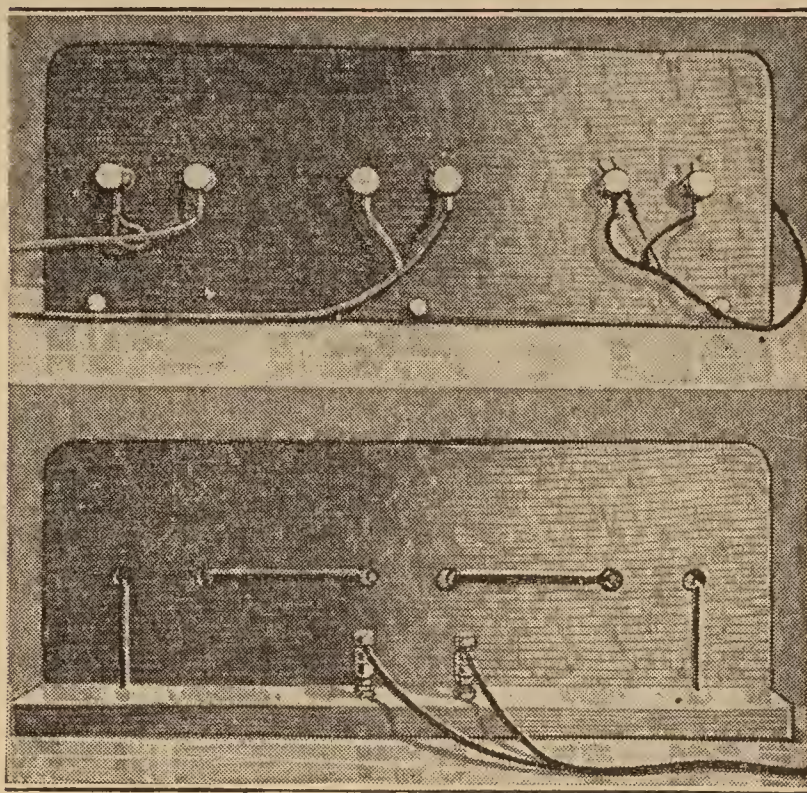


A Garden Mulcher and Weeder That can be Pushed Along between the Rows of Growing Plants is Easily Made from the Revolving Blades of an Old Lawn Mower

other weights as will be necessary to cause the mulcher to cut to the proper depth. In use the tool is pushed or pulled between the rows. The blades will revolve and cut into the soil and, due to arrangement of the cutters, the ground will be loosened and stirred up quite effectively.—G. E. Hendrickson, Argyle, Wisconsin.

Using Several Phones on Radio Receiver

The insistent demands of friends of the radio amateur that he entertain them at an evening of grand opera or musical



A Device for Connecting Several Sets of Phones to the Radio-Receiving Apparatus, Which is Located in Another Part of the Building, Making It Unnecessary for the Audience to Crowd into the Laboratory

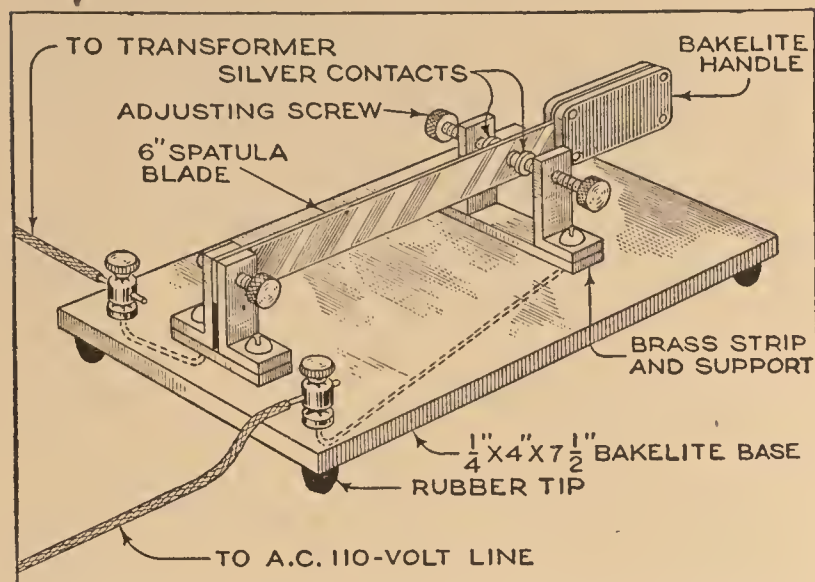
numbers generally present him with somewhat of a problem if he has but a single pair of phone terminals on his cabinet, and no loud-talking device. In the present case the placement of the phones in another room was also something of a problem. In order to connect the three sets of phones used, the device shown in the photograph was made. Two boards, each 18 in. long, and about 6 in. wide, were screwed together at right angles, and three pairs of binding posts were placed on the front and connected in series at the back. The connecting wires were then run underneath the base to the two binding posts at the rear. The lead from the phone terminals of the radio set were then run to the room and connected to the binding posts on the base.—W. J. McGuffage, Chicago, Ill.

Tire Chains for Emergencies

Repair sections for tire chains are obtainable for a few cents each, and these can be attached to the wheel of an automobile by stove bolts or wingnuts, without the necessity of jacking up the car. A few such sections, which should be long enough for their ends to meet when passed around the tire, placed on the rear wheels of the car, will furnish sufficient traction to enable it, in most cases, to be driven out of sand and mud.

How to Make a High-Speed Key

The "bug" or vibrating key has become quite popular with radio amateurs, and can no longer be considered the exclusive



A Vibrator-Type Transmitting Key for the Amateur Radio Operator, Which is Built Up from Easily Obtainable Parts, Makes It Possible to Develop Great Sending Speed

property of the commercial or professional operator. This type of key was first used by wire-telegraph operators to attain great speed, and, as it is easy to build and easy to operate, it is really a great improvement over the old-fashioned type of key. The movement of the key is from side to side instead of up and down, and with a little practice amazing speed in sending can be acquired. However, the operator should exercise some judgment, and not use so great a speed that he cannot transmit correctly.

The base, which is made of $\frac{1}{4}$ -in. bakelite, is supported on rubber feet to permit the wires to be run on the underside, as shown by the dotted lines on the drawing. The vibrator, or blade, can be made from any of various materials, such as a thin, flexible nail file, hacksaw blades, and the like, although an artist's spatula, as shown in the drawing, makes an ideal blade. The original handle of the spatula is removed, and two strips of bakelite are cut to form an insulating handle, which is held together by small machine screws, so placed as not to come into contact with the blade. A $\frac{1}{8}$ -in. hole is drilled near the other end of the blade, which is supported between brackets of the type shown; these are formed from $\frac{1}{8}$ -in. sheet brass, and the blade is securely fastened between them by a screw. Machine screws are used for attaching the brackets to the base. The front brackets, near the handle, are made of the same material and to the same dimensions as those holding the blade at the rear. These brackets are mounted on a brass strip, and each is

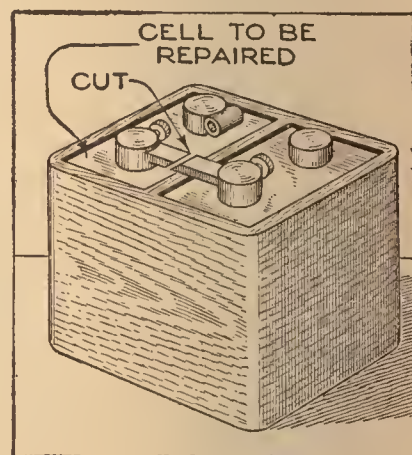
provided with a knurled-head screw, as indicated. Coin-silver contacts are soldered to the tips of these screws and to the blade, at the points where it makes contact with the screws.

Adjustments are easily made when the blade is in position, by merely turning the thumbscrews. When the key assembly is completed, one wire is led from the base of the contact-point brackets to one of the binding posts, and another is led from the supporting brackets at the end of the blade to the second binding post. Owing to the fact that the steel blade always tends to straighten itself no switch is needed, because, if the contact points are adjusted to a uniform distance from the blade, it will not come into contact with them when not in use. After the wiring is completed, and the terminals soldered, the key is ready to be connected in series with the supply line leading to the transformer.—F. L. Brittin, Chicago, Ill.

Repairing Storage Batteries

Storage batteries may be repaired without the trouble of removing the jars from the case, and without melting the cross-

bars in order to remove a set of plates. A diagonal cut is sawed in the connecting bar, as shown, and the plates of the defective cell are lifted out after the sealing compound has been sufficiently softened.



After the plates have been repaired or the separators renewed, the crossbar is carefully soldered together. To facilitate soldering, the ends are pried up slightly and a piece of wood, or a piece of an old separator, is slid under the cut, which is then cleaned, fluxed, bent back into place, and soldered.

Removing Spots from Varnished Surfaces

To remove white spots from a varnished surface, make up, in the proportions given, the following mixture: raw linseed oil, $\frac{1}{2}$ pt.; turpentine, $\frac{1}{2}$ pt., and denatured alcohol, $\frac{1}{2}$ pt. Shake well until thoroughly mixed. Dampen a piece of cheesecloth with this mixture and rub the spots several times, or until they disappear. If tightly corked, the mixture will keep indefinitely.



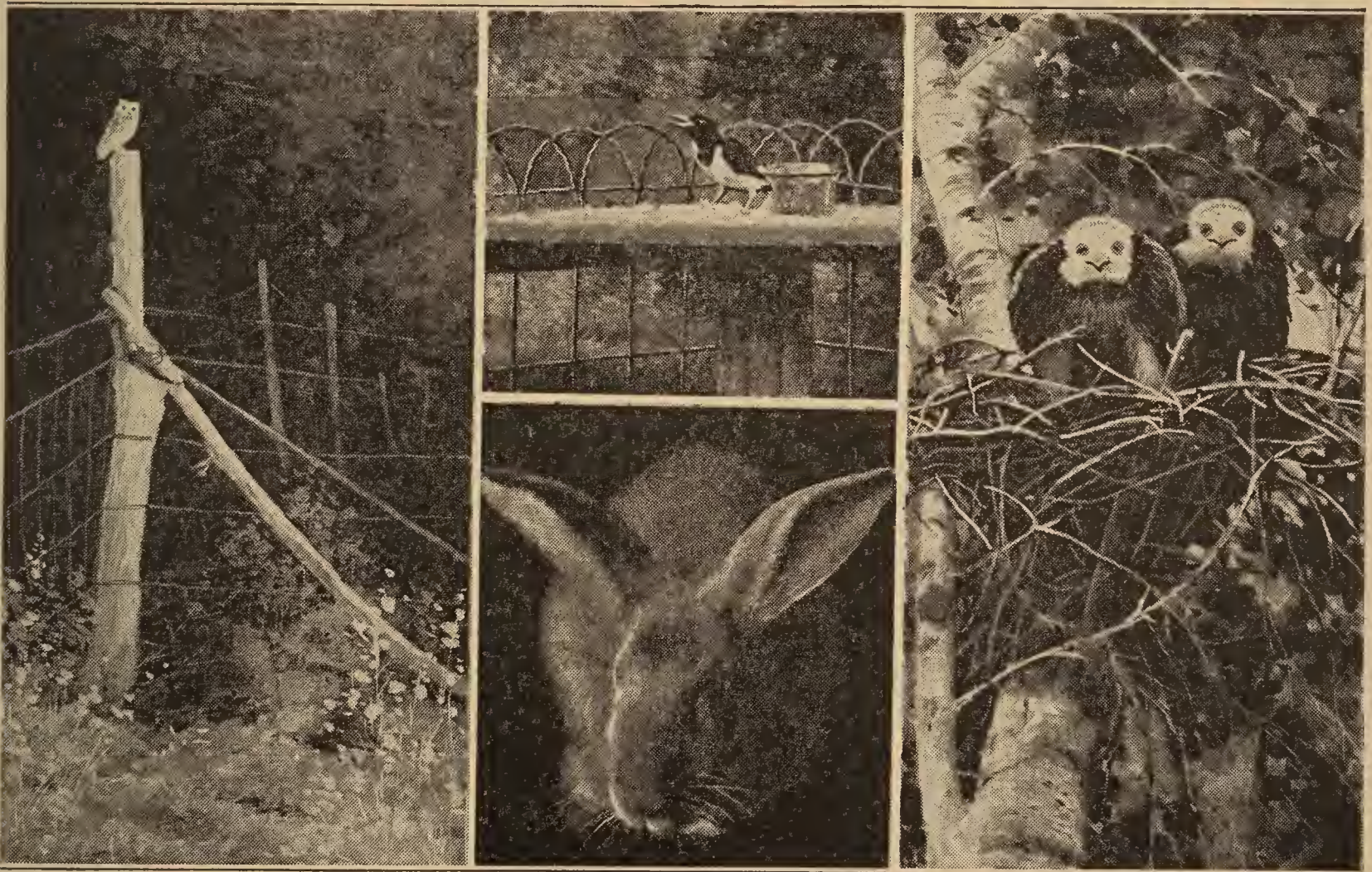
Photographing Wild Birds and Animals

By NELSON EDWARDS

IT is the ambition of every amateur photographer, and some professionals, to get good close-up pictures of birds and animals. There are a number of more or less satisfactory methods of placing the camera and releasing the shutter, but what is probably the most effective arrangement is operated electrically. The shutter-releasing mechanism is the most important detail, and can be made from

dry cells in series with a suitable push button. In this manner the operator can be concealed several hundred feet away and be assured that, when the button is pressed, the camera shutter will be positively operated.

Practically any camera can be used, although it is preferable to use a long-focus lens, because then the camera will not have to be placed so close to nests

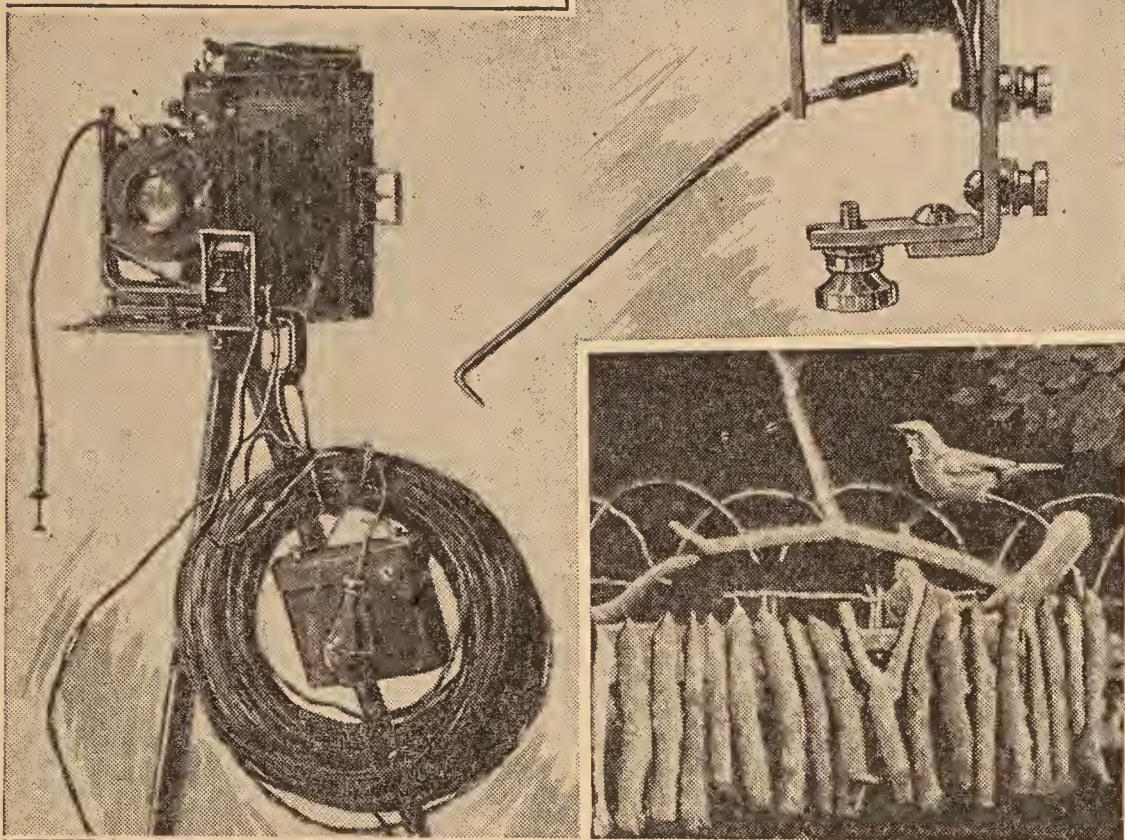


Photographs of Wild Birds and Animals That Show Good Close-Up Views, Are the Ambition of Many Amateur, and Some Professional, Photographers. Left: Flashlight Photograph of a Prairie Owl, the Flash being Set Off Electrically. Upper Center: Red-Headed Woodpecker Getting a Free Lunch from the Feeding Board. Lower Center: Close-Up Portrait of a Rabbit. Right: A Pair of Aggressive Young Hawks in Their Cottonwood

the electromagnet of an old doorbell. The magnet is attached to the camera bed, and the shutter trigger is connected to the armature by means of a link made from part of a bicycle spoke. Any lost motion between the armature and trigger can be taken up by turning the threaded nipple on the end of the spoke. The magnet is connected to one or two

and roosts. The camera should be camouflaged to correspond as closely as possible to the surroundings, and whenever possible, it is best to do this by degrees; then, after a few days, when the suspicions of the animals have been allayed, the camera can be set. The object of this is to avoid the frightened appearance found in many photographs of birds and

animals. As fast a lens as possible is advised, and the lens opening, or stop, and duration of exposure depend entirely upon the light conditions. Under some conditions a hand mirror can be used to reflect light into dark places. At times it is advisable to



The Electromagnet from an Old Doorbell Clamped to the Camera Bed Makes a Positive-Acting Shutter Release. The Connecting Link between the Shutter Trigger and Armature is Made from a Bicycle Spoke. The Device is Operated by Dry Cells, and Wire can be Strung to the Point Where the Operator is Concealed. Lower Right: Snapshot of an English Sparrow

cut away a few branches to admit light over the spot on which the lens is focused, and this point should be marked so that the sharpest possible image of the subject will be obtained when the shutter is opened. It is hardly advisable to use a shutter speed of less than $\frac{1}{25}$ second, as birds and animals are generally on the move and their movements are quick.

The concealed operator will find a pair of field glasses useful, and if he has the required degree of patience and a genuine love of nature and photography, he will spend many a pleasant hour in making a pictorial record of his wild neighbors.

Removing Obstinate Corks

Large corks in bottles and jugs are not always easy to remove if one is in a hurry. In order to facilitate removal of such corks, cut strips of tape, and, when inserting the corks, place a strip on the cork so that the two ends will project beyond the neck. When the ends of the tape are pulled, the stopper will come out easily.—S. L. Bastin, Bournemouth, Eng.

New Remedy for "Grabbing" Clutch

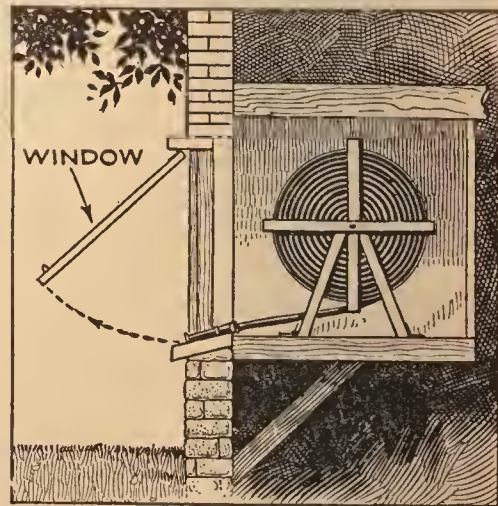
A "grabbing" clutch is something that most motorists are bothered with at one time or another, especially if the car is equipped with a dry-disk type of clutch.

It is easy to advise the application of castor oil, but it is a harder job to apply a few drops of the thick oil so that it will reach the troublesome portions of the disks, and still not saturate the surface so much as to allow the clutch to slip.

By diluting the oil with four to five times its bulk of alcohol or gasoline, an easily applied mixture is obtained. The gasoline or alcohol serves the additional purpose of carrying the oil into the fibers of the clutch facing and softening the hardened spots, and since the diluting agent rapidly evaporates, the nonvolatile oil remains distributed in small quantities over the whole surface of the disks. Used in this dilute form it is nearly impossible to apply too much oil to the clutch.—G. W. Greene, Madison, Wisconsin.

Hose Stored in Basement Window

Dragging the garden hose up and down from the basement whenever it is used is a tiresome and bothersome task, but by utilizing one of the cellar windows in the manner shown, the hose is conveniently stored close to the water connection. A



box or shelf is built inside the window. The legs of the hose reel are cut off and securely fastened to the shelf, to prevent it from pulling loose when the hose is unreeled.—L. B. Robbins, Harwich, Mass.

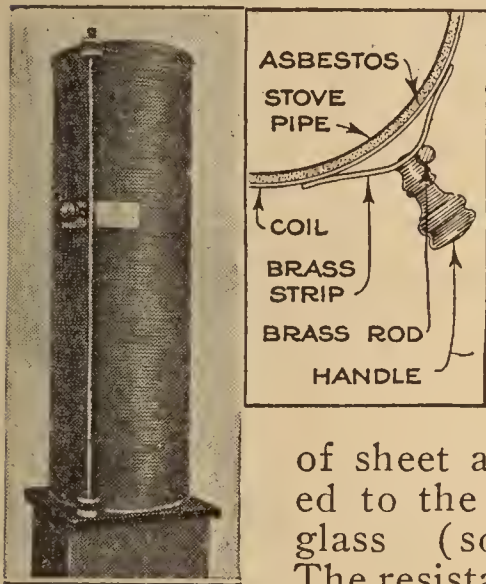
Tucking in Short Blankets

Woolen blankets are usually a little too short to make it possible to tuck them under the foot of the mattress and still cover enough of the bed to protect the occupant. For this reason, when the bed is made up, the blankets are not allowed to extend far enough at the foot for proper tucking in, to the discomfort of the sleeper whose feet are often exposed to the chilling atmosphere of the sleeping room.

To remedy this, sew a strip of strong muslin, about 1 ft. wide, across one end of the blanket; the extra length is tucked under the end of the mattress, leaving the entire woolen blanket on top of the bed.—Herbert A. Strickler, Buffalo, N. Y.

A Simple Electrical-Resistance Coil

A cheap resistance coil for arc lamps can easily be made by any amateur electrician from a length of stovepipe, suitably insulated and wound with resistance wire.



ably insulated and wound with resistance wire.

An 18-in. length of 5½-in. stovepipe is the foundation for the coil, and this is covered with a piece

of sheet asbestos, cemented to the pipe with water glass (sodium silicate). The resistance is composed of about 125 turns of ¼-in.

iron wire, the turns being spaced about ⅜ in. apart. A brass rod, held at its ends in porcelain insulators, is spaced about ⅜ in. away from the winding. The insulators are secured to the opposite ends of the stovepipe by wire loops. The upper end of the rod is connected to one side of the arc-lamp circuit, and the upper end of the resistance winding connected to a binding post. A strip of stiff sheet brass, about ½ by 1 by 3 in., is bent to the form indicated, provided with an insulated knob, and pushed under the brass rod and against the coils. The resistance of the circuit is controlled by moving the brass slide up or down. About 250 ft. of wire will be required for the winding, and, when completed, the resistance can be mounted on a piece of asbestos, fiber, or plaster board.—Frank B. Howe, Los Angeles, Calif.

Landing Net for Catching Poultry

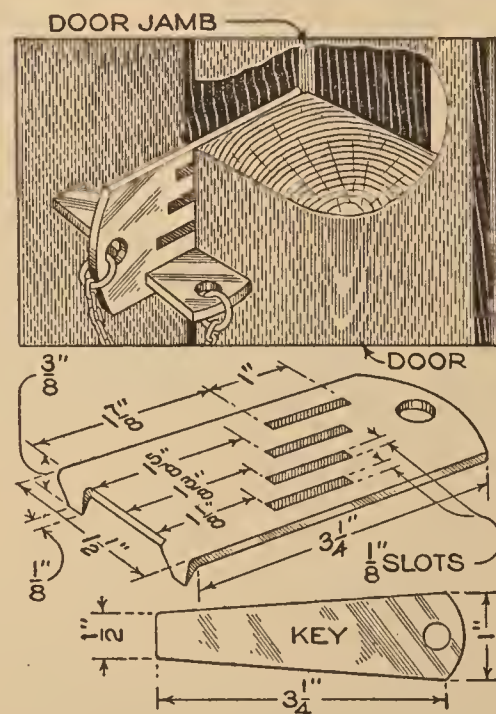
A poultryman who handles hundreds of fowls has found that an ordinary landing net, such as used by fishermen, is one of his most useful pieces of equipment. The net is of large size and is provided with a 4-ft. handle. With such an arrangement it is a comparatively simple matter to capture a fowl with a minimum of confusion to the rest of the flock, and with very little exertion on the part of the poultryman.—Orin Crooker, Wheaton, Ill.



A Handy Portable Lock

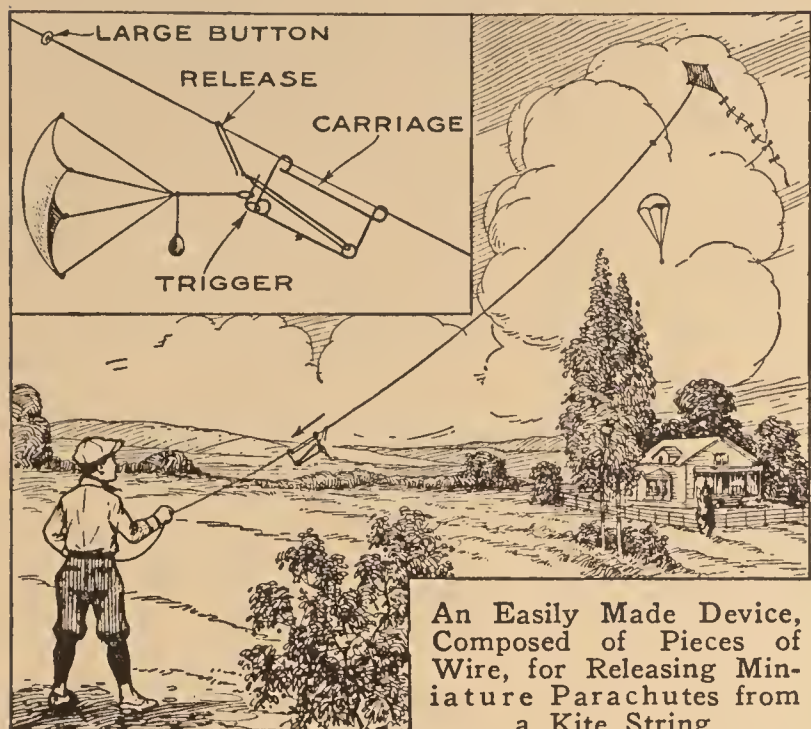
Travelers who feel insecure behind the flimsy or disabled locks that may be found in many out-of-the-way hostleries—and some city hotels—can use a detachable lock

of the type shown in the drawing, and sleep with the assurance that anyone trying to force the door to which it is attached, will arouse the occupant of the room. An ⅛-in. steel plate is cut to the form and dimensions given, and the two points are bent over and sharpened. Several slots are cut through the plate, and a metal wedge, or key, is provided to fit them. In use, the sharpened points of the lock are forced into the wooden door jamb against the stop strip; then the door is closed, and the wedge pushed home tightly in the proper slot.—Louis Schneider, Clinton, Missouri.



Parachute Drop for a Kite

Every boy likes to drop a parachute from his kite when it is high in the air, but nearly always he has trouble getting



it to drop when he wants it to, or else gets things hopelessly tangled and spoils the fun.

The little device shown in the drawing can be placed on the kite string without breaking the cord. Wire is used for making all the parts, and the completed article should not be more than about 5 in. long. The carriage is first formed, then another small piece for the trigger, and a third for the release.

When formed as shown, the "drop" can be hooked over the string. Tie a short piece of string to the parachute just above the weight, make a loop in the end to slip over the trigger, and drop the release over the trigger, as well. The wind will catch the parachute and pull it toward the kite, right up the string. Then, the minute the release strikes the large button that has already been tied to the kite string, the former will be raised, releasing the trigger and liberating the parachute, while the drop comes sliding down the string ready for another trip.—A. R. Mutton, Waterloo, Ia.

Uses for Old Inner Tubes

When shucking corn in wet weather, the lower limbs are always wet from wading in the grass, and this is a fertile cause of rheumatism and its allied afflictions. In place of rubber boots, that have various disadvantages, sections cut from a 4-in. inner tube, that are pulled over the legs, afford complete protection. Larger or smaller tubes can be used as

demanding by the size of the ankle. The rubber tubes are pulled on over the trousers and are entirely waterproof.

Another application of old tubes by the corn husker makes use of a 6 or 8-in. section, punched with holes and pulled on over the wrists; this provides complete protection against chapped, cracked, and sore wrists.

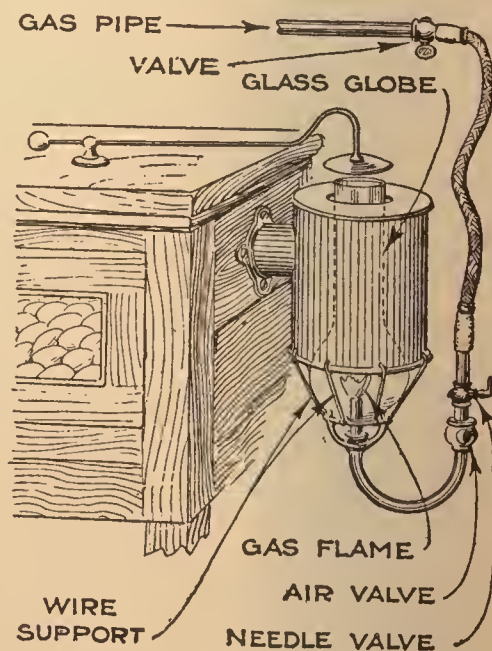
Saws, when stored and shipped with other tools, are very likely to jar loose from their supports, and to have their teeth practically ruined. To overcome this, a carpenter who travels about considerably, pulls a section of inner tube over each saw before placing it in his tool box.—Rufus E. Deering, Clements, Kansas.

Freezing the Pipe to Move a Faucet

When it became desirable to change a faucet from one position to another in the pipe line, it was necessary to cut a piece out of the line and thread the end. There being no way to shut off the water, the plan of freezing the pipe was tried and found to work perfectly. As the same line of pipe could be reached at a point somewhat nearer the source of supply than the place where the work was to be done, a mixture of salt and ice was packed around the pipe at that point, freezing the water so that the pipe could be cut and threaded.—C. D. Shupp, Nehawka, Neb.

Gas Burner for Incubator

Where a supply of gas is available, it is possible to do away with the messy, odorous, and generally bothersome kerosene lamps that are used to furnish the proper warmth in incubators. An ordinary inverted-mantle Bunsen burner is arranged as shown and connected to the gas supply, the pressure of which is quite closely controlled by regulating the needle valve.—Roy Sterritts, Springfield, Ohio.



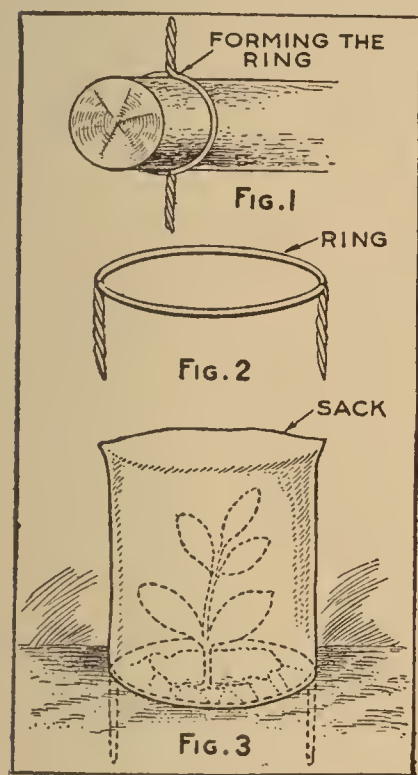
Preventing Decay of Buried Posts

A simple method for preventing the decay of posts supporting rustic structures and, in fact, wherever a post is buried in the ground, consists of inserting the post in a concrete-filled section of drain tile.

The post hole is dug and the tile inserted. Several inches of concrete mixture are poured into the bottom, the post put in position, and the surrounding space between the post and tile filled with cement.

Protecting Early Plants

Paper bags are widely used for protecting plants that have been set out before the danger of frost has entirely passed, but if the bags are not securely fastened they are easily blown away. A holder, which can be made easily, from odds and ends of wire, will keep the bags securely in place.



Two pieces of wire of equal length are formed into a circle around the end of a smoothed-off log, or piece of pipe, as in Fig. 1, the ends being tightly twisted.

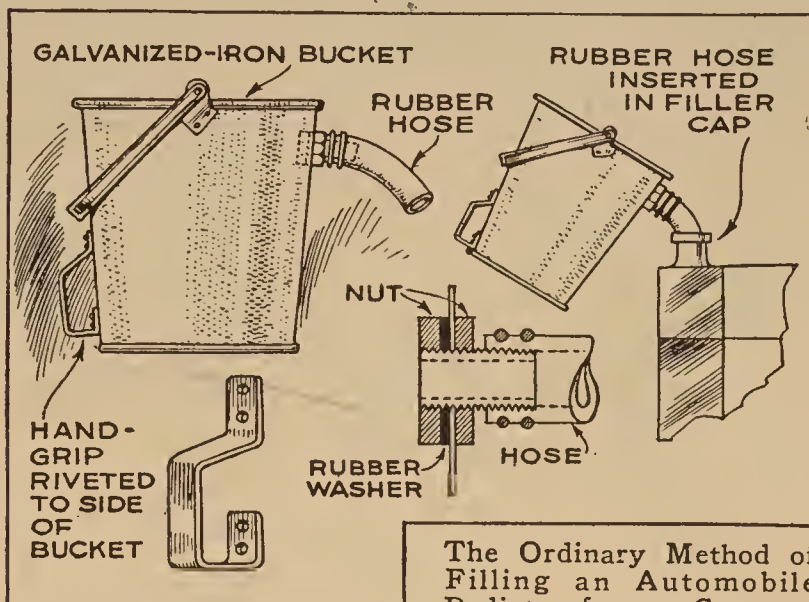
After the ring has been removed, the twisted ends are bent at right angles, as indicated by Fig. 2. In use the ring is slipped inside the paper bag and the mouth is crimped over so that the protruding wire ends will pierce the paper, as in Fig. 3. The wires are pushed into the ground until the mouth of the bag rests against the earth.—Dale R. Van Horn, Lincoln, Neb.

An Improved Radiator-Filling Bucket

The average garage or filling station usually has a bucket of the round galvanized-iron type for filling automobile radiators; a spout on any of these buckets is a rarity, and in consequence, water is poured over the car and splashed over the shoes and trousers, making an unsatisfactory and disagreeable job of an ordinarily simple task.

The drawing shows how one enterprising garageman attached a spout to his

filling bucket for the convenience of his patrons. A hole was punched just under the upper rim of the bucket, and a pipe



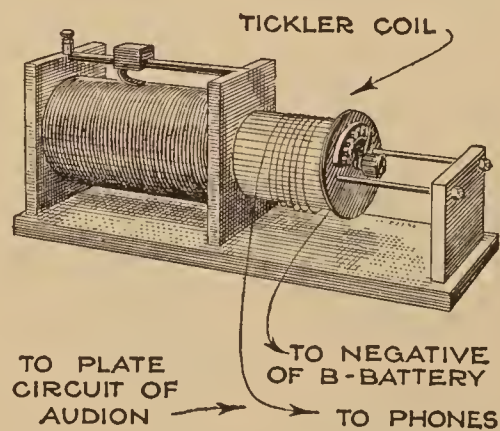
The Ordinary Method of Filling an Automobile Radiator from a Common Bucket Makes a Disagreeable Task Out of a Simple Job. The Addition of a Flexible Spout and a Handle Makes a Great Difference in the Ease and Cleanliness of the Task

nipple fitted in position with locknuts, rubber gaskets being used between the nuts and the bucket. A short length of hose was wired to the pipe to provide a flexible pouring spout.

A handle, for convenience in pouring, was made of flat iron and riveted to the side of the bucket opposite the spout. Any bucket can be altered in this manner for either public or private convenience.—G. A. Luers, Washington, D. C.

Increasing Loose-Coupler Efficiency

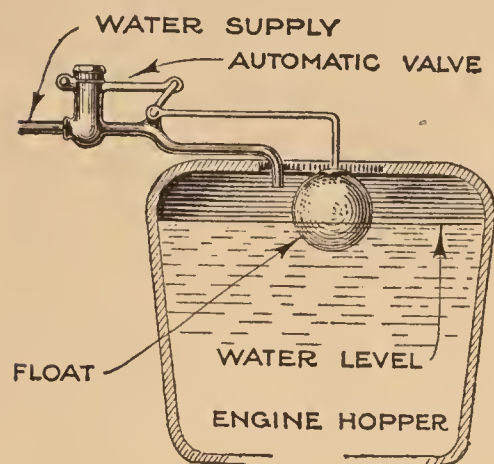
The efficiency of the familiar loose coupler, that forms a part of a considerable number of amateur radio stations, can be increased measurably by a simple dodge. Wind some No. 28 or No. 30 gauge wire into a coil sufficiently large to fit loosely over the secondary of the coupler, as indicated in



the drawing. No definite number of turns can be given as this is best determined by experiment. Connect the ends of the coil to the plate circuit of the audion, one wire to the negative pole of the B-battery, and the other to the phones. Application of this idea to the loose coupler really turns it into an inductive feed-back regenerative set, giving results that rival those of the more complicated regenerative set.—Wayne W. Leyrer, Atlantic City, N. J.

Float Valve for Engine Hopper

Hopper-cooled internal-combustion engines, such as are commonly used for power purposes on the farm, have an ailment all their own, which is, that if the hopper goes dry, the engine overheats,

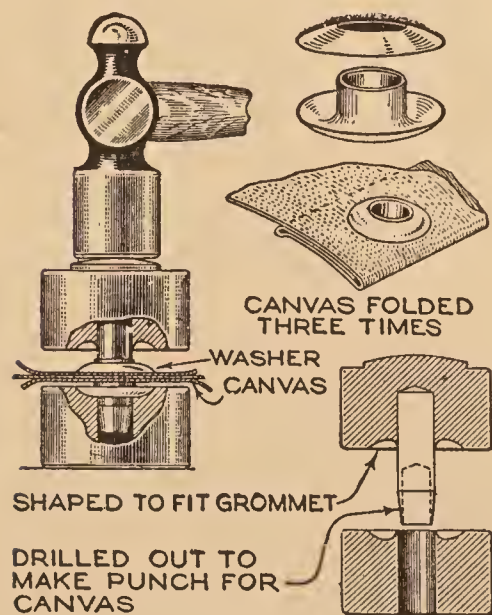


and the cylinder is likely to "seize," unless strict watch is kept on the water supply. The drawing shows how a closet-tank float valve was arranged to keep a sufficient supply of water in the

hopper at all times. A longer float rod was substituted for the original one, so that it could be bent at right angles and yet be at the proper height for shutting off the flow of water. Then the intake side was connected to the water-supply pipe, and the outlet bent down over the edge of the hopper. A valve was placed in the water line back of the float valve, so that the water could be turned off when repairs were necessary. In this manner the hopper can be kept filled to its maximum level, regardless of how long the engine is run without attention.

A Simple Grommet Die

The camper, motorist, or boat owner who makes one of the grommet dies shown in the drawing, will be able to make up his own tents, covers, sleeping bags, sails, and similar canvas gear, putting in



the grommet rings wherever needed. If the edge of the canvas is folded over to make three thicknesses, no sewing will be required. Two short pieces of cold-rolled steel bar, or shafting, will be needed, and also a third

piece to form the punch, which should have the same diameter as the center hole of the grommet, a separate punch

and die being required for each size. The punch is made a driving fit in the center of the upper part of the die, and an easy push fit through the hole in the lower half. If the end of the punch is drilled out and tapered to a sharp edge, it can be used to punch holes in the canvas preparatory to the insertion of the grommets. The inner face of each of the die blocks is next faced off accurately, preferably in a lathe, and then the annular grooves shown are turned to the shape of the grommet ring and washer, with a hand tool.

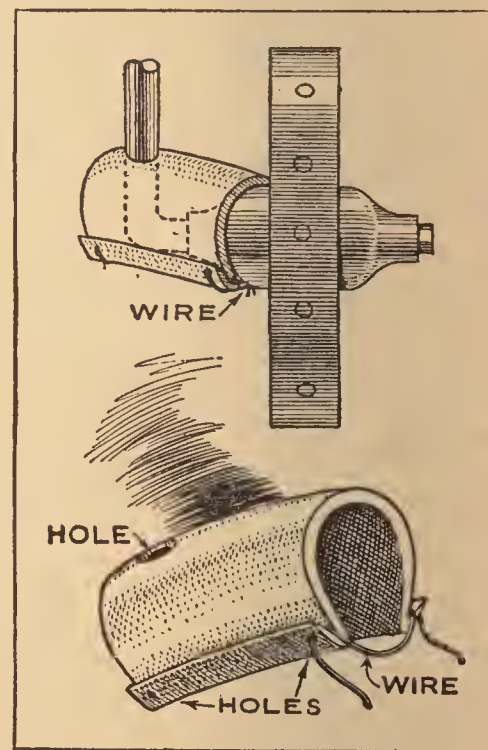
In use, a grommet is placed upon the face of the lower die, the perforated canvas placed over the upturned sleeve, and the washer put on; the punch is then inserted, pushed down, and then lightly hammered, until the punch block is all the way home. This operation curls the end of the grommet sleeve over the washer and swages the whole tightly together, with the canvas between.

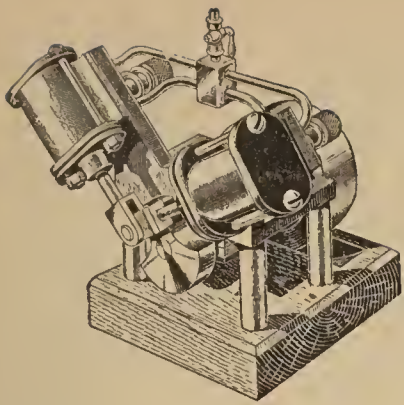
Dust Shields for Plow Wheels

The greatest factor contributing to the wear of farm machinery is the dust and sand that find their way into the wheel bearings, where, mixing with the grease, they form a grinding compound that soon wears out the

axle and its bearing. Some provision is usually made to protect the bearings from the entrance of such grit, but it is usually not very effective, as it does not conform closely enough to the shape of the wheel hub and the irregular-shaped shank which supports the plow.

A section cut from a small tire casing makes a good shield for this purpose. The piece should be long enough to reach from the spokes of the wheel to about 2 in. beyond the upright shank. A hole that will fit closely around the shank is cut in the top of the casing, then either the shank or the wheel is removed so that the protector can be slipped over the former. A piece of wire is used to draw the edges of the casing closely around the wheel hub.





A TWIN-CYLINDER OSCILLATING ENGINE

By J. V. ROMIG

BEFORE describing the construction of a model oscillating engine, a few words on the history of this type of prime mover will add greatly to the interest of the work, and to the possession of any model engine of this type.

The first oscillating engine was built in 1785, by Murdoch, manager of the Boulton and Watt works, the first builders of separate-condensing engines. Richard Trevithick, a pioneer in locomotive building, also is said to have suggested this form of engine in the latter part of the 18th century. The first 60 years of the 19th century saw the engine perfected and widely applied to paddle steamers. The introduction of the compound engine and the screw propeller, however, marked the beginning of the end for the oscillating engine, and it is now practically obsolete. Many very simple and interesting models of this type may be made, however, and for model power boats it is still one of the best types, due to the low headroom necessary for its installation.

The model oscillating engine described herein is a particularly suitable engine with which to start the young model maker on his model engineering career, as no castings are employed in its construction, and the cylinders are so made that the engine may be entirely dismantled at any time, either for repair or for instructional purposes.

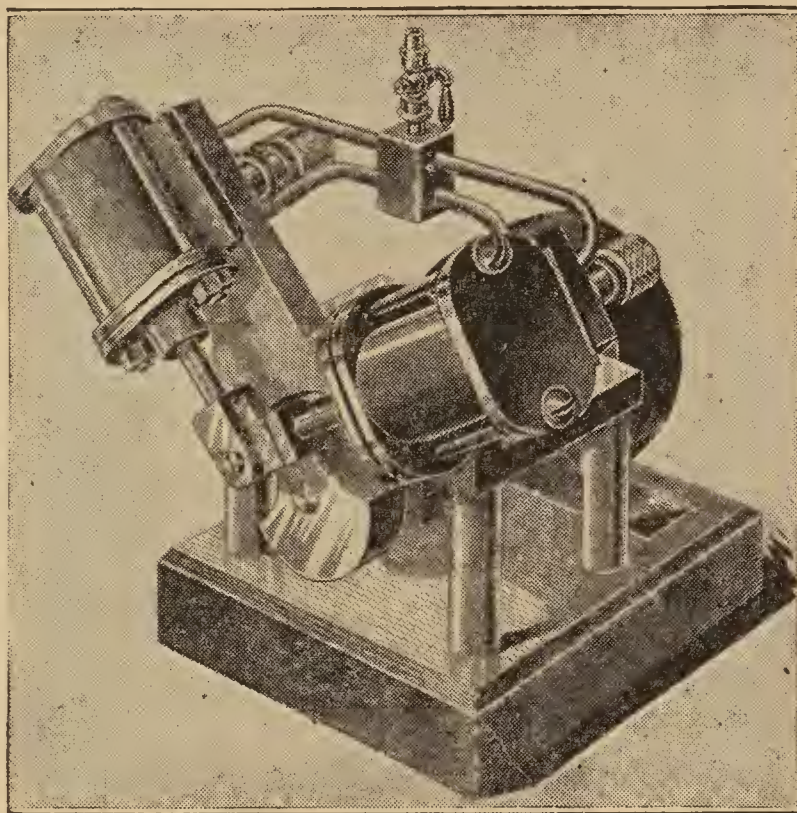
With this design, the engine is so well balanced that the flywheel may be dispensed with, if desired; dimensions for a suitable flywheel are given in the drawing, however, as its presence adds greatly to the appearance of the model.

The first part to be made is the frame;

this is made of steel angle bar, which should be $\frac{1}{4}$ to $\frac{1}{2}$ -in. larger on the sides and about $\frac{1}{4}$ in. longer than the finished sizes shown, say about 2 by 2 by $4\frac{1}{4}$ in., so that, when finished to size, the edges will be square and clean. The faces should be filed square before cutting the frame to shape, and finished after cutting, with a fine file and scraper, until the faces are dead square and flat. The holes for the pivots, steam and exhaust ports, bearings, and columns, if the last are used, can

then be laid out and drilled, and the bearing and column-screw holes tapped. The cylinders are cut from brass tubing of $\frac{3}{4}$ -in. outside and $\frac{5}{8}$ -in. inside diameter, and each cylinder has soldered to it a $\frac{3}{4}$ by $1\frac{3}{32}$ -in. brass plate, scraped to fit perfectly against the vertical face of the frame. Before soldering these plates to the cylinders, they are drilled and countersunk for the $\frac{3}{16}$ -in. pivot screws, which are then sweated into place.

The joints of the plates and cylinders should be well filled in with solder, which is filed with a rat-tail file to form neat fillets, as shown. The cylinder ports may now be laid out and drilled. The upper cylinder heads have a $\frac{1}{32}$ -in. boss turned on one face, to fit the cylinder heads, and the top faces are plain. The lower heads also have this boss, and, in addition, a $\frac{5}{16}$ by $\frac{1}{8}$ -in. boss on the lower side, which forms the packing gland, and a $\frac{3}{16}$ -in. hole for the piston rod. Two stuffing boxes should be made, fitted, and drilled at the same time as the cylinder heads. Perfect alinement of the cylinder-bolt holes may be assured by clamping the heads and stuffing boxes to their respective cylinders and drilling all at once, with the tapping-size drill, the

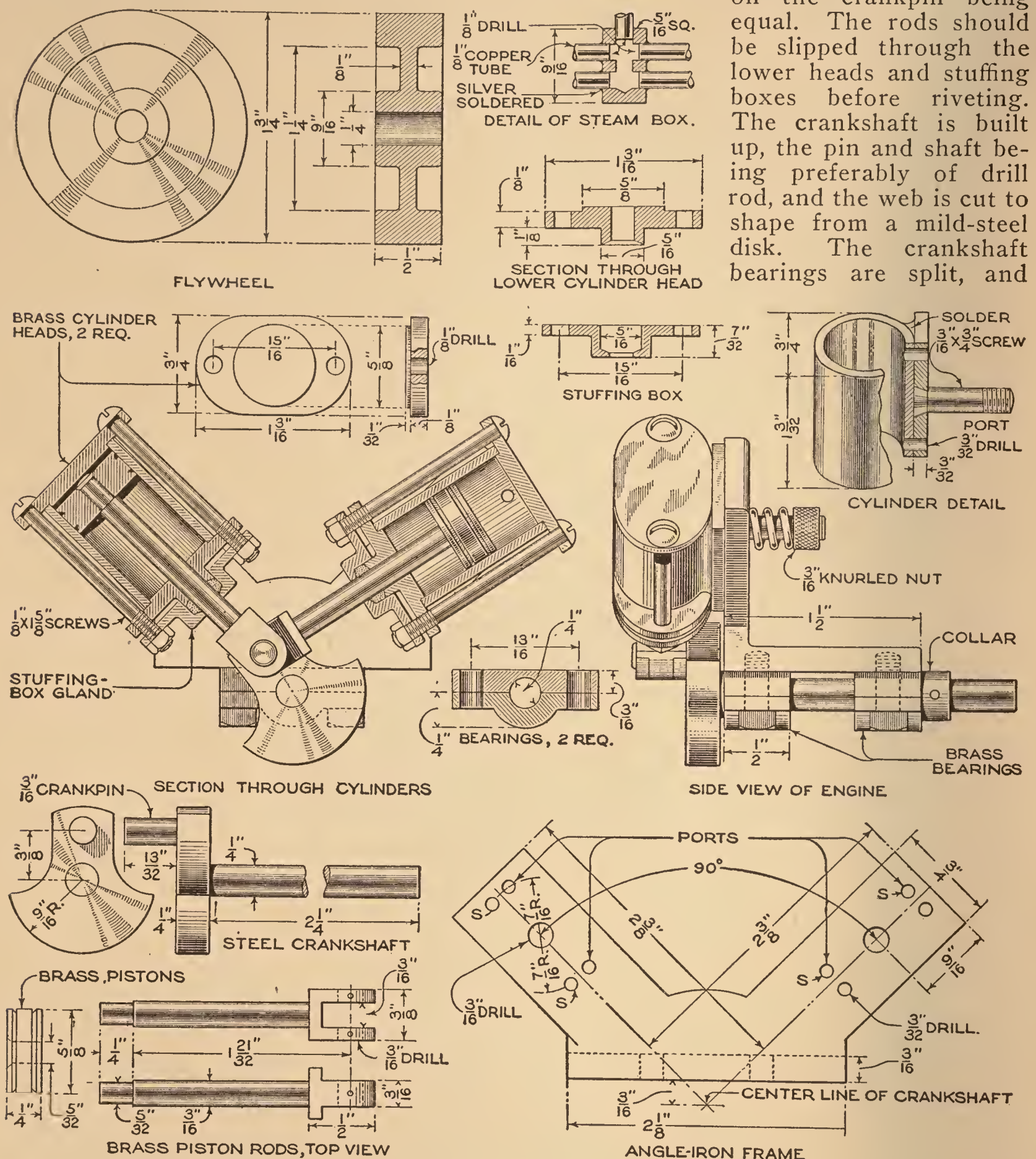


Suggested Assembly of Model If Used for Exhibition Purposes: Properly Built and Finished, This Makes a Most Attractive Engine

holes in the upper heads and stuffing boxes being drilled out afterward with a clearing drill. The lower heads are tapped to fit the bolts. Soft cord, dipped in melted paraffin, makes a good packing for the box.

bar, the ends being riveted into countersunk holes, drilled in the pistons while the latter are held in the lathe chuck. The lower ends of the rods are shaped as in the drawing, the area of the ends bearing

on the crankpin being equal. The rods should be slipped through the lower heads and stuffing boxes before riveting. The crankshaft is built up, the pin and shaft being preferably of drill rod, and the web is cut to shape from a mild-steel disk. The crankshaft bearings are split, and



Full Details for Building the Model: Note Particularly the Location of the Steam and Exhaust Ports. Steam Ports are Marked "S" on the Drawing of the Frame. The Exhaust Ports are Not Piped, the Steam Escaping Directly into the Air. For Land Use, the Engine may be Provided with a Flywheel, a Suitable Design for This being Shown at the Top of the Drawing

The pistons are turned from brass-bar stock, and have V-grooves turned in the periphery, as shown; these grooves retain oil and water, and are quite as efficient as piston rings in engines of this size. The piston rods are turned from square brass

these should be cut out, the screw holes drilled, and the bearings clamped together endwise against the bottom face of the frame, before the crankshaft-bearing holes are drilled; every care should be taken that these holes are in alinement, as a little

extra time spent in this will save much work later on. Oil holes should be provided for all bearings. Where a flywheel is not used, a small collar, pinned to the shaft, will keep the latter in its bearings.

All the steam ports are connected to one common supply pipe; a simple way to do this is to make a "steam box," as shown in the detail, of square brass bar. Holes are first drilled in the bar, as shown, of the same diameter as the bore of the tubing used. These are then counter-bored to the outside diameter of the tubing, and the four tubes sweated in place with silver solder. The tubes are connected to the steam ports in the frame in the same way. The exhaust ports are not piped; the steam is allowed to exhaust directly to the atmosphere.

The arrangement of the engine shown in the assembly view is entirely suggestive, but is a very suitable one, if the model is to be used only for exhibition purposes or for driving model machinery. The columns are made of brass rod, drilled along the axis, and screws are run right through them, from the underside of the wooden base to holes drilled and

tapped in the base of the frame. This arrangement is favorable to the use of a flywheel, which may be of either brass or steel, although steel is preferable for appearance's sake. It may be setscrewed or pinned to the shaft, or may even be keyed, if more realism is desired.

One feature of this design, as before mentioned, lies in the ease with which the engine may be taken apart. To remove the cylinders, it is only necessary to unscrew the pivot nuts and slide the piston rods off the crankpin, and the cylinders are dismantled by merely unscrewing four bolts.

Owing to the underhung crankshaft, this engine is very suitable for small model power boats; the frame, when the engine is used for this purpose, is bolted to small sills, and, the flywheel being dispensed with, the engine can be set right down in the bottom of the boat, thus giving a very small angle to the propeller shaft—a very desirable feature. The connection to the propeller shaft should be through a flexible coupling of simple design, which will compensate for any slight error in alinement.

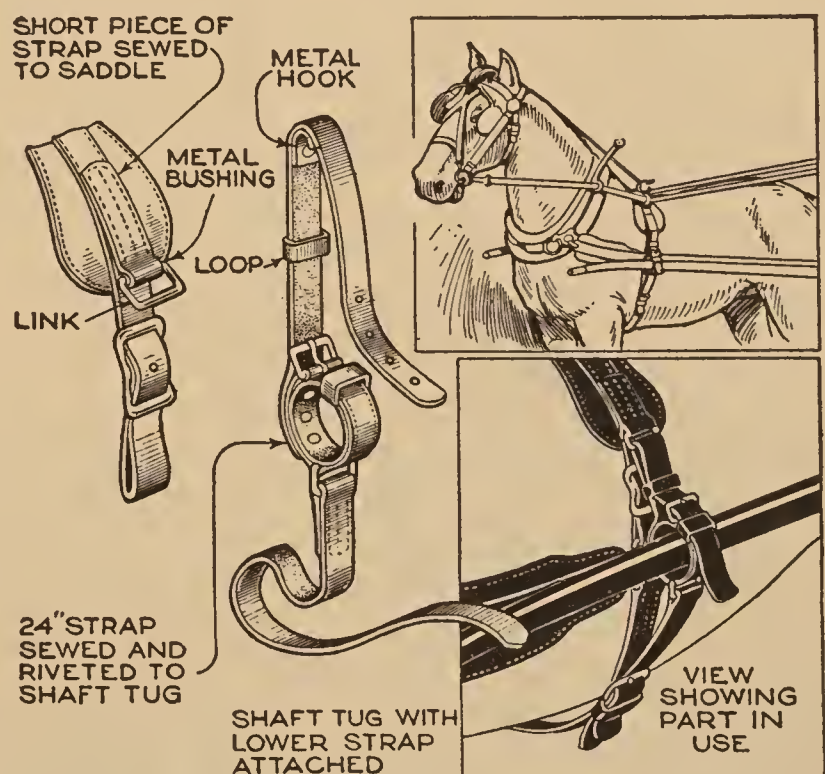
Ignition System Kept Dry by Newspaper

A simple practice that results in keeping the ignition system of an automobile dry during a heavy shower, consists in placing a newspaper over the cowl and engine hood. The rain plasters it in place, and as long as it remains wet, the paper will stick in place. The paper closes the gap at the edge of the cowl and at the hood hinges, causing the rain to run off.

Combination Single and Double Harness

Farmers and teamsters using double harnesses of the type that has a saddle, or backband, can easily adapt them for the use of a single horse, thus saving the cost of a special set of harness. The only extras required for the change are a pair of shaft tugs; two pieces of strap, about 8 in. long; two other pieces, about 24 in. long, and two links. The latter are permanently fastened to the ends of the saddle with the short pieces of strap. The longer straps are riveted to the shaft tugs, being provided with metal hooks to take the wear of the links. Shaft tugs, with the lower strap already attached, can be bought ready-made from any harness dealer. When the harness is to be used single, the shaft tugs are fastened to the

links, as shown in the drawing, with the lower strap fastened to the buckle on



Changing a Double Harness into a Harness for One Horse is Quite Simply Effected by the Addition of a Few Straps and a Pair of Shaft Tugs

the bellyband. Only a few minutes are needed to make the change from a double to single harness without removing it from the animal, and if properly made, such a harness will be as strong and as satisfactory as any single harness.—Chas. Albert, Chicago, Ill.

An Indoor Baseball Game

A light 8 by 16-in. board is elevated at one end by means of a square stick, and drilled with five holes, about 1 in. in diam-



An Indoor Baseball Game That may be Played by Two Players, and is Made Only of Two Pieces of Wood and Some Nails

eter, in the positions shown in the drawing. The two upper holes are called "singles," the hole just below this a "double," the next a "triple," and the last one is a "home run." Around these holes small wire brads are driven into the board, irregularly placed but with sufficient space between them to allow a marble to pass. The outline of a ball diamond is drawn upon a card, and the three bases and homeplate are indicated on it. Each of the two players is provided with nine checkers which correspond to the players on his team.

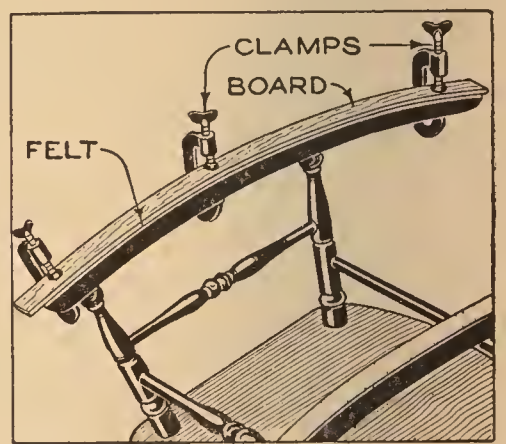
When the game is on, one of the players places a checker on the homeplate as a batter. Then, the marble is placed between the two nails at the top center of the inclined board and allowed to roll. If it falls into the "single" hole, the "batter" is advanced to first base, and another checker is put up. The game is played just as the regular game, and when three men are out, the second player's team of checkers comes to bat, and the other team takes the field. If the marble lodges in the tacks below the horizontal line on the board, it is a "base on balls" and if the marble stops above the line, it counts a "strike-out." Should the marble roll entirely off the board without entering any of the holes, it counts an "out." Score-cards can be prepared and the game made almost as exciting as a real game.

New Use for Adhesive Tape

Of the hundreds of purposes for which adhesive tape has been used, none is more original than that of a camper who, having been deprived of his hose supporters as a practical joke, used strips of tape in place of his missing property. Several short strips of adhesive tape were cut, a part of each strip being applied to the top of the hose, and the other end stuck to the skin of the leg.

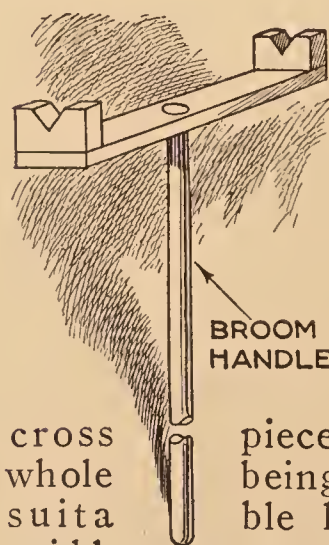
Felt Tires for the Rocking Chair

It is aggravating to the housekeeper when the varnished surface of a floor becomes worn by the rockers of a chair. This annoyance can be prevented, and longer life given the floor finish by gluing a strip of felt to the underside of each chair rocker. Liquid glue or linoleum cement can be used for holding the felt strip to the wood. In order to bring the felt into contact with the wood at all points, the method of clamping shown in the drawing should be used, and the board and clamps allowed to remain overnight.—Harry H. Houck, Rochester, N. Y.



An Aid for Hanging Curtains

The device shown in the drawing is intended to be used for placing curtain poles and rods on their brackets, or for removing them without the necessity of climbing a ladder, table, or other furniture, at the risk of personal injury.



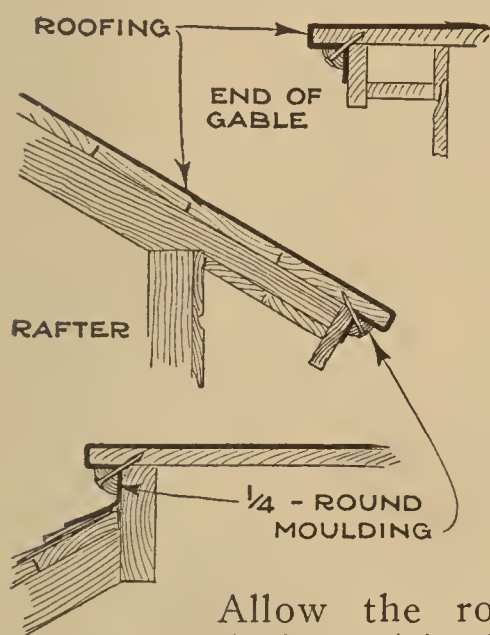
The notched end blocks are about 1/2 in. thick and 3 in. wide, and are fastened to a piece about 1 ft. long, the being mounted on a handle of ble length—a broom handle answer the purpose. To put up or remove the curtains it is only necessary to place the rod in the notches and lift or lower as may be necessary.—C. S. Cierpik, Chicago, Ill.

Draft Necessary for Farm Implements

In estimating the power required to operate different farm implements it is necessary to know several things. The depth of operation is of most importance, next the slope of the land, the character of the soil, and the amount of cut made by the implement. A grain drill of the single-disk type, with from 16 to 20 holes, on average level ground usually requires about 30 lb. pull. Shoe and hoe types require more; this is for an average depth of two inches. A tooth harrow will require a draft of about 50 lb. for each foot of width, the harrow having four bars and the teeth spaced 12 in. apart. A disk harrow will require about 100 lb. per foot of width to operate in plowed ground, and about 80 lb. in operating on cornstalk land.

Fastening Roofing Paper under Eaves

When roofing paper is used to cover a building, it is at times something of a problem to figure out a way of fastening



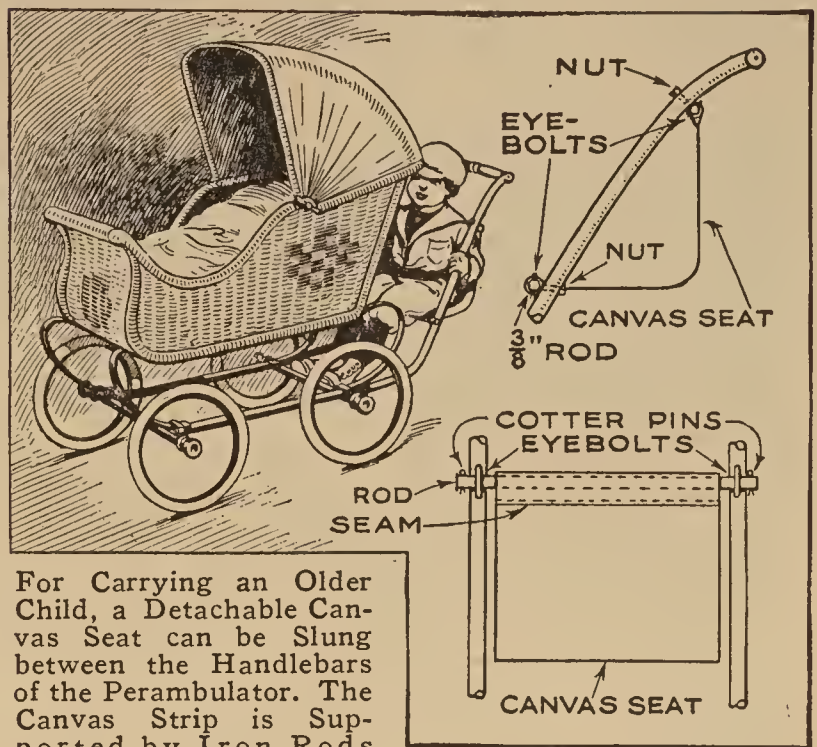
it to the eaves, so that the roof will not leak, and so that the wind cannot get underneath it and tear it away. To make a good job of such work, the roofing boards should extend about 2 in. beyond the cornice strip.

Allow the roofing paper to extend about 4 in. beyond the edge of the roof; fold this back underneath and nail it into the corner with a strip of quarter-round molding. The same method can be used to fasten the ends of the roofing underneath the gables.—Geo. G. McVicker, North Bend, Neb.

An Extra Seat for the Baby Carriage

The four-year-old son of the family would often tire of walking on the necessary outings of a younger occupant of the baby carriage, and would have to be carried by the father while he propelled the perambulator. Seeking some method of relieving himself of carrying the child in his arms, he fitted a detachable seat between the handles for the first-born.

Two iron-rod crosspieces were fitted to the frame, by means of eyebolts pass-



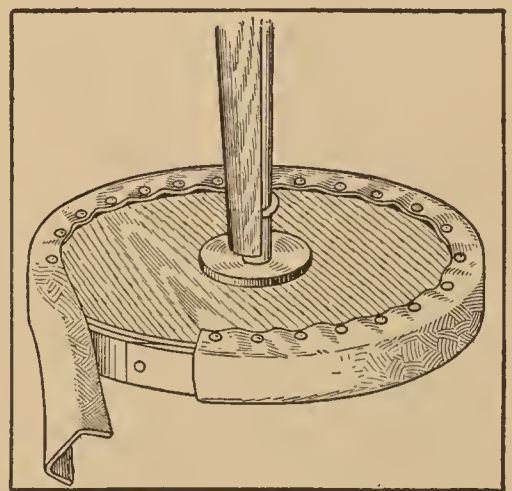
For Carrying an Older Child, a Detachable Canvas Seat can be Slung between the Handlebars of the Perambulator. The Canvas Strip is Supported by Iron Rods

ing through holes drilled in the handles. A strip of canvas, long enough to make a seat, was made with a hem at each end through which the rods were inserted. The ends of the rods were placed in the eyebolts, and were prevented from coming out by cotter pins inserted into holes in the ends of the rods.—Frank Harazim, New York City.

Rubber Tires for Wooden Wheels

The small wooden wheels that are frequently used on various articles of household furniture and toys can be fitted with rubber tires

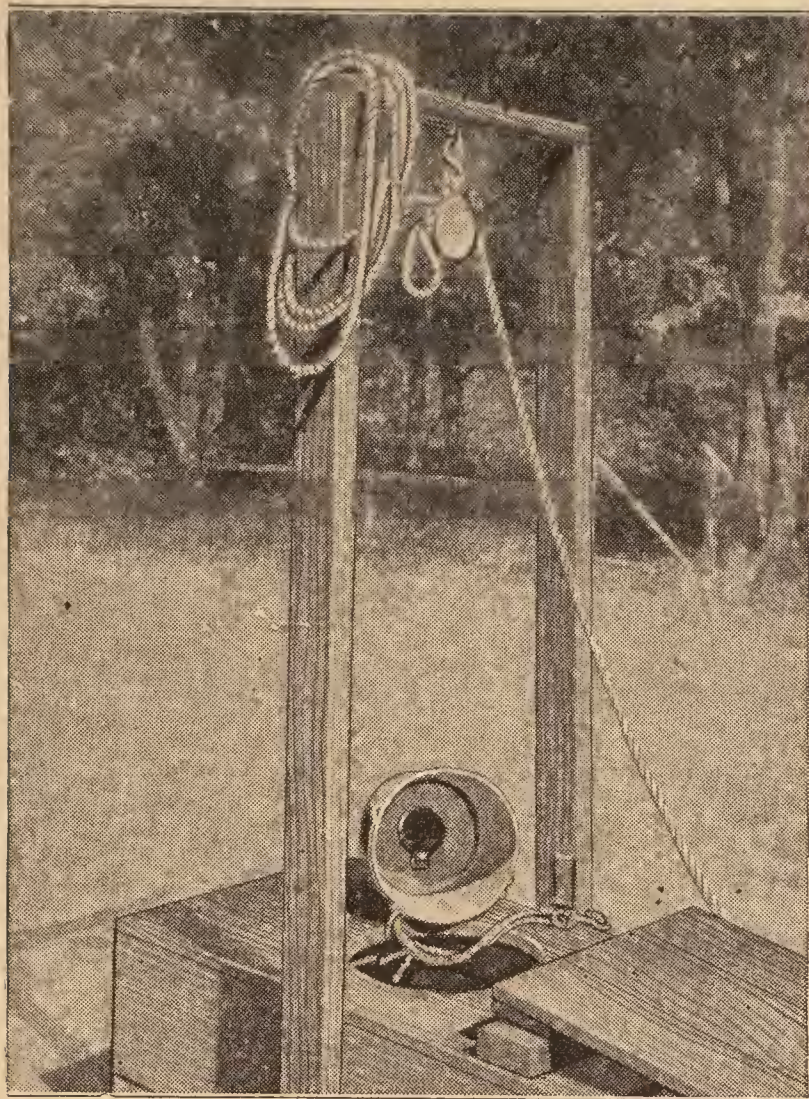
that will make them run more easily and noiselessly. Old automobile inner tubes are used as in the drawing. First, two strips of rubber are tacked around the



outside of the wheel, after which another and somewhat wider strip is applied, the edges of which are turned over and tacked down. When the outer band has become worn, it can be removed and another applied in its place. In case the tacks on the outside of the wheel are deemed unsightly, they, as well as the edge of the rubber strip, may be concealed underneath a suitable gimp.—S. E. Gibbs, Corydon, Ia.

Getting Water from Low Well

A well contained so little water in dry periods that it was impossible to draw water by means of the pump; as water



Galvanized-Iron Bucket with a Leather Flap Valve, Used to Draw Water from an Almost Dry Well

was necessary, the pump was pulled up, and the bucket shown in the photograph used. An ordinary galvanized-iron bucket had a 2½-in. hole cut through the bottom at its center. A leather flap valve was riveted to the inside so that, when the bucket was lowered, the water was forced up through the hole, the leather flap preventing it from running out again. A heavy iron ring was riveted around the lower rim of the bucket, to prevent it from floating on the surface and to hasten the filling.—Harry W. Poor, Boston, Massachusetts.

Improving and Waterproofing the Army Pup Tent

Probably no shelter man has ever crept into has been so abused as the army shelter tent, the principal score against it being that it affords but little room, as it has no walls and the pitch comes straight down to the ground. The improvement consists in adding a wall or sides to the tent, and this is all that is needed to make it thoroughly serviceable. This wall need

not be of any great height, a strip of canvas, about 1 ft. wide, sewed around the bottom of the tent, will raise it sufficiently to provide space for two. The weight of a tent thus altered is increased but a few ounces, and, with a twig bed, accommodates two comfortably.

To waterproof the tent, dissolve about 1 lb. of alum in ½ gal. of boiling water. When this has been thoroughly stirred and the alum dissolved, pour it into 2 gal. of cold water. The tent is soaked in this solution for 24 hours, when it is removed and the excess solution wrung from it. The tent is then immersed in a second solution made by dissolving ½ lb. of sugar of lead in 3 qt. of boiling water, which is added to 2 gal. of cold water. In this, the tent is soaked for about eight hours; then removed and hung up to dry without wringing it.—Robert Page Lincoln, Minneapolis, Minn.

Small Screwdrivers from Buttonhooks

An ordinary buttonhook, converted into a small screwdriver by filing off the end to a chisel-shaped point, provides a means for handling the many small screws in the lamp sockets and other lighting apparatus of the average automobile. As it is frequently necessary to handle screws in deep recesses, this light tool will often prove its value.

Chicken-Feed Box

A handy arrangement for keeping the chicken feed in or near the runs where it is to be

used, may be made after the manner of the one shown in the photograph. By using this, it is unnecessary to store the feed in the house or barn and carry it thence to the poultry yard. The feed box is a wooden box supported on legs, with the rear end somewhat higher than the front. An opening is cut into the lower end of the box and the outflow of feed is regulated by a sliding gate.—E. E. Johnson, Ingleside, Calif.



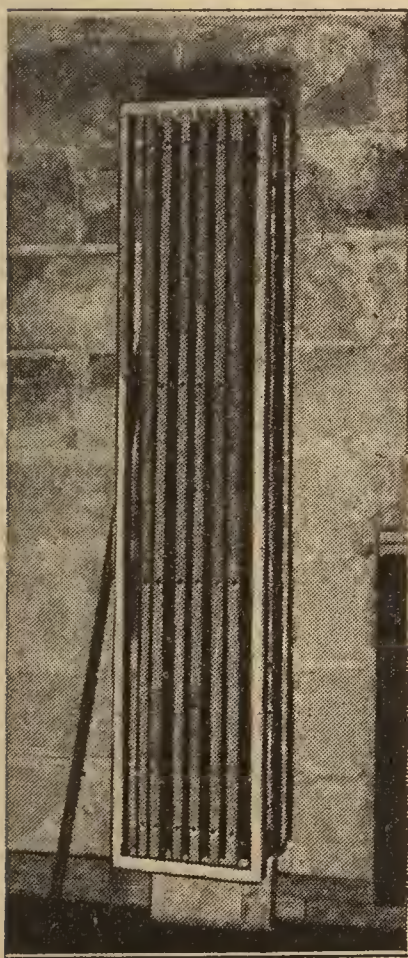
Furnace Cement Repairs Fireplace

Annoyed for a long time by the bricks becoming loose and falling out of the fire wall of an open fireplace, and being unable to find anyone who could guarantee a permanent repair, the owner decided to cover the wall with furnace cement. This cement, used by furnace men to seal the joints between the sections of cast-iron furnaces, becomes almost iron-hard when subjected to heat. The cement was applied to the brick surface with a putty knife, and no further trouble has been experienced.—Burke Powell, Albia, Ia.

Planting Lettuce near Currants

Currant bushes are notorious as the favorite breeding place of some varieties of aphids, and if lettuce is planted near by, it is almost certain that the latter will also become infested with the insects. Lettuce planted near currant bushes is an open invitation to the pests, which are very hard to wash off the lettuce leaves. There is only one way to get rid of them, and that is to soak the lettuce for an hour in strong salt water, but it is better to use a little forethought and plant the lettuce as far away from the currant bushes as possible.

Storing Extra Table Leaves



The crate of table leaves that is furnished with every extension dining table is generally stored in some closet, or other out-of-the-way place, where it is difficult to get at the boards when company comes.

The photograph reproduced here-with shows how one householder disposed of his table leaves. The crate is nailed to the sill of the house in the basement, near the cellar stairs. Being thus disposed of,

the entire outfit is elevated from the floor, within easy reach, and secured so that there is no possibility of the narrow crate being upset.

Gate Arbor Made from Wagon Wheel

The felloes from one or more old wagon or buggy wheels can be used to make an artistic curved arbor over a gate,



An Artistic Arbor for a Gate or Garden Seat That can be Easily Built from the Felloes of Old Wagon or Buggy Wheels

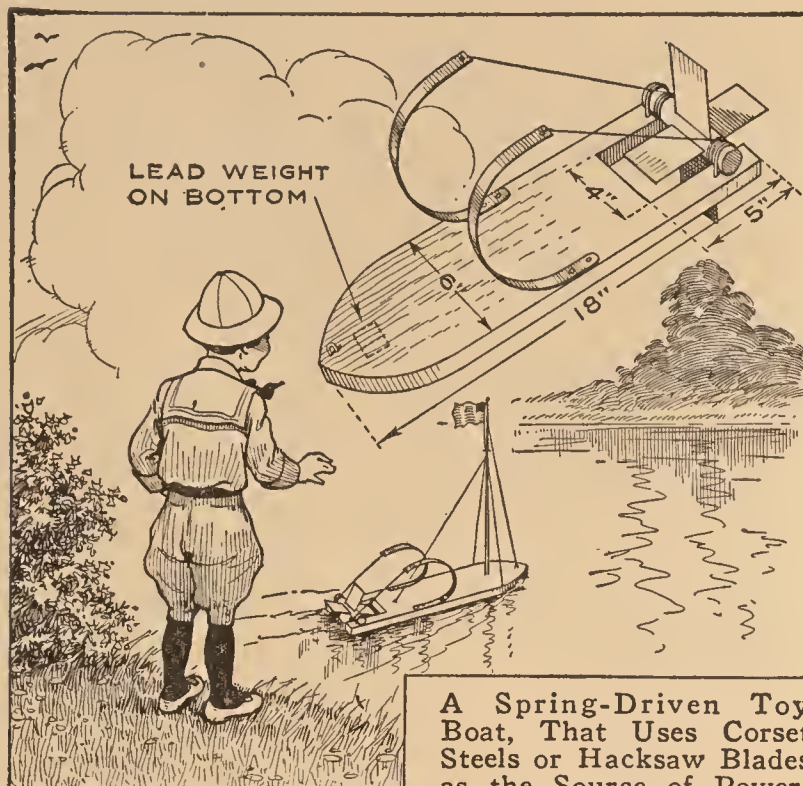
garden seat, or other garden furniture in which a curve is desired. In the arbor shown in the photograph, the sectors of the wheel are mounted on posts, and support a flowering vine, greatly improving, at little expense, the appearance of what would otherwise be a very commonplace entrance.—Harry Warneck, New York City.

Artificial Showers for Fishing

Seasoned and practical fishermen have wondered why, after fishing on a bright day without a nibble, the fish should strike ravenously during a light shower. There are two reasons for this. In the first place, the falling drops agitate the surface of the water so that the fish cannot see the fisherman and are not afraid to bite, and secondly, the rain knocks insects upon which the fish feed into the water. Taking advantage of this habit, the fishermen of Catalina Island, off which the famous tuna and yellowtail are caught, install a small power pump in their boats and throw a spray close to the boat where they wish to fish.—Rev. O. P. Avery, Portland, Ore.

A Spring-Driven Toy Boat

A boat that is propelled by springs, and that will furnish much amusement to children, may easily be made from no more



A Spring-Driven Toy Boat, That Uses Corset Steels or Hacksaw Blades as the Source of Power, can be Driven in a Forward or Backward Direction, Depending upon How It is Wound Up

elaborate materials than a piece of board, a pair of corset steels or hacksaw blades, and some pieces of tin.

The board is cut to approximately the outline of a boat, and a piece is cut from the stern to accommodate the paddle wheel, the latter being made by inserting pieces of tin into slots cut into a round wooden axle. Staples are used to secure the ends of the axle to the board. The two springs are mounted opposite each other, as shown, and a piece of stout string is attached to the free ends and to each side of the paddle-wheel axle. When the paddle wheel is wound up, the string will draw the springs up in arcs as illustrated, and as soon as the wheel is released, the tendency of the springs to resume their horizontal position will revolve the paddle wheel and cause the boat to move forward or backward, depending upon which direction the wheel is turned when winding.—Paul E. Rimbey, Roodhouse, Ill.

Propeller Bearing for Model Airplane

In making model airplanes, trouble is often experienced in finding a suitable bearing for the propeller shaft. For this purpose a short piece of glass tubing, of a diameter just large enough to permit free turning of the shaft, may be used. The end next the propeller is heated in a gas or alcohol flame until it is softened, when the sharp edges become rounded off.

Combined Fruit and Shade Trees

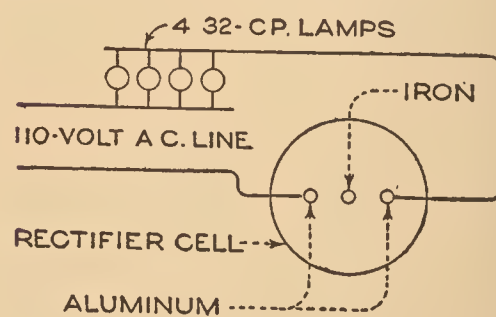
There is one kind of shade tree that is also a fruit tree—the apple. The apple is a native American tree, and at one period was much used for the grounds of farm and village homes.

One of the first points is the particular apple variety. As varieties have been evolved and propagated by budding and grafting, trees with different characteristics of trunk and limb growth have come into common use.

Some trees naturally make a low head, while others go high in the air; some mature early and others late; therefore, when one plants an apple tree for shade, the standard type of that tree in maturity should be known. One of the varieties that makes a particularly good shade tree is the so-called Stayman winesap. The winesap is not only a splendid apple, one of the best of winter varieties, but it makes a beautiful tree. The blossoms in spring and the fruit in autumn are additional charms possessed by the apple as a shade tree. The apple is a naturally long-lived tree and does not attain a size that is much out of proportion to its surroundings as do some other trees.—Oscar C. Place, Boulder, Colo.

“Forming” Electrolytic Rectifier Plates

The operation of an electrolytic rectifier depends upon the formation of an insulating film on the aluminum plates when the current flows from the electrolyte to the plate, thus opening the circuit.



A current from the plate to the solution will dissipate this film and permit the current to pass.

It is necessary that the plates be “formed” before the rectifier is permanently connected in the circuit. The electrolytic rectifier, described on page 459 of the March, 1920, number, has the plates connected to the line, hence excessive current will flow until the plates are formed. The formation may be brought about by the heavy current in due course, but the preferred method is to connect the device as shown in the diagram.

The cell is left connected, as shown, until the lamps go out, indicating that the film is formed and the circuit is open. The length of time required for this

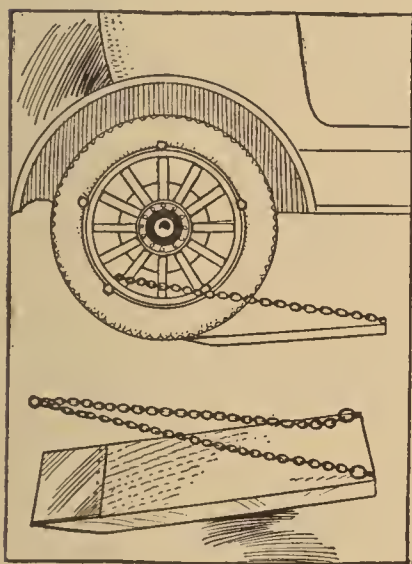
formation varies greatly, depending upon the grade of aluminum used. Some plates will form at practically the first surge of current, others take an hour or more; the formation can be hastened by scratching the surface of the plates with a wire brush.

When in use, the device will pull a little over four amperes, and the more perfect the plate formation, the closer the current will be to this figure. After the plates have been formed, the rectifier is connected in the circuit according to the diagram shown in the previous article.

Owing to the fact that alloys of aluminum are sometimes sold as pure aluminum, a set of plates may not function properly. Should this happen, and the plates not form within an hour, it is advisable to try another electrolyte. A common one consists of a saturated solution of ammonium phosphate, to which is added a few drops of acid to reduce the resistance. The plates should also be formed in this solution. There is no question of the rectifier working properly once the plates are formed.

Pulling Cars Out of Mud or Sand

To pull a car or truck out of sand, or a mudhole, under its own power, is quite simply done by the use of an iron-shod



plank with a chain attached to the front corners, as shown in the drawing. In use, the skid is placed on the ground in front of one of the rear wheels and the chain is passed around one of the spokes. As the power is gradually applied, the car is pulled up onto the plank. The only

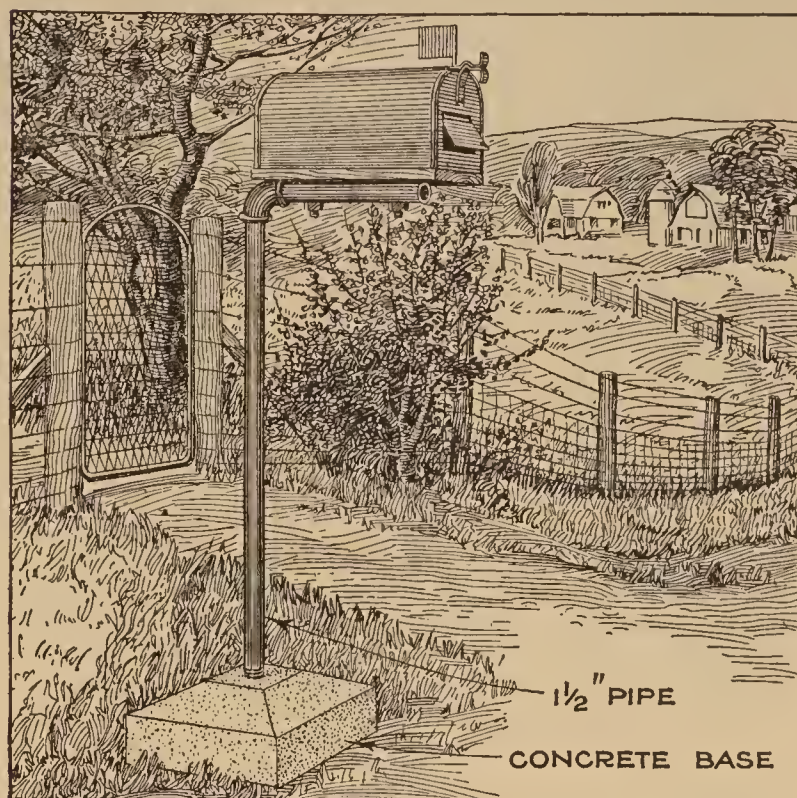
objection to this method is the possible damage to the spokes from contact with the chain, and this can easily be prevented by covering the chain with a length of heavy hose.—Robt. H. Neill, Ottawa, Ohio.

Concrete Base for Mail Box

A type of concrete base used for the mail boxes along rural routes in one of the western states has a number of features to commend it.

The concrete base is 16 in. square and 6 in. high, with a bevel of 2 in. The

standard is made from 1½-in. pipe, and the box is simply screwed or nailed on a wooden base bolted to the horizontal member of the standard. The whole out-

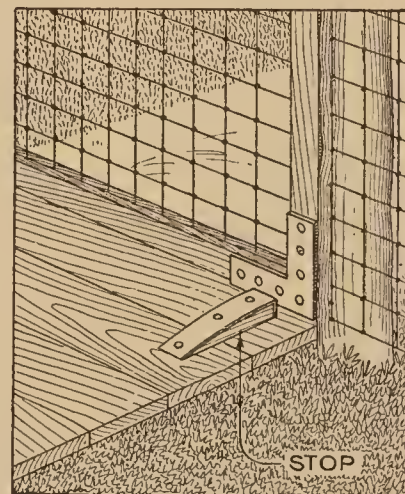


A Type of Standard for Supporting Mail Boxes along Rural-Delivery Routes, That Is Attractive, Practically Indestructible, and Easily Portable

fit costs but a trifle over a dollar to make, and besides being sightly and practically indestructible, it is portable, so that the position of the mail box can be altered as desired.—Stuart C. Mahuran, Mason City, Ia.

A Simple Gate Stop

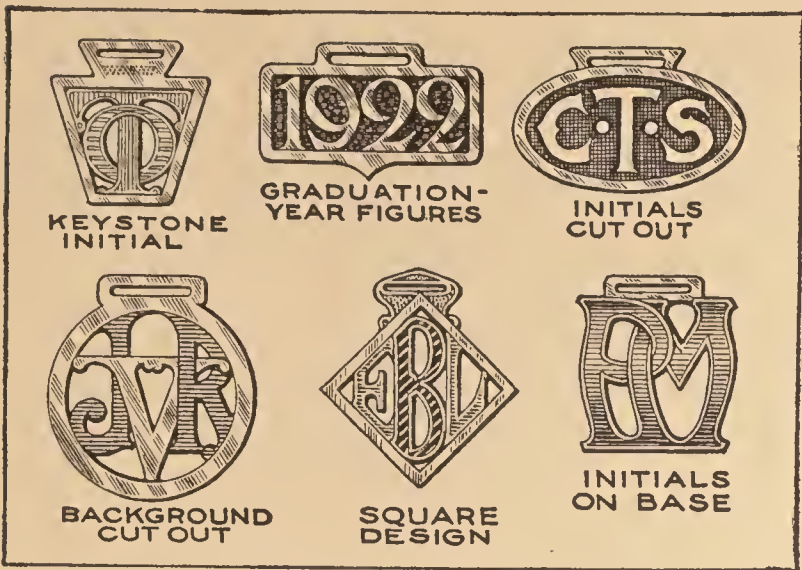
A simple device for keeping a gate closed consists of an iron-faced wedge, securely attached to the walk back of the gate. The wedge should have a long, gradual slope, be faced with a strip of flat iron, and be just a trifle higher than the distance between the bottom of the gate and walk. Fasten the wedge firmly to the walk so that when the gate is closed it will ride up the inclined face of the wedge



and drop down behind the end, thus holding it shut. See that the stop is not so high that too much effort is required to open the gate. Such a wedge will take the place of a latch, and the gate is opened by lifting it the fraction of an inch necessary to raise it above the end of the stop.—J. Alexander, Lincoln, Neb.

Making Watch Fobs

Brass, copper, german silver, and other metals in sheet form lend themselves admirably to the manufacture of watch fobs,



Various Forms of Monograms That can be Cut from Sheet Metal with a Small Coping Saw: Automobile-Radiator Monograms, Belt Buckles, Monograms for Leather Handbags, and Similar Articles can be Made in the Same Manner

which can be finished in an endless variety of pleasing designs.

The design is first drawn on paper; this is then pasted onto a disk or square of the metal to be used, and small holes are drilled at the corners of the design, large enough to permit the insertion of a jeweler's or coping-saw blade. The metal is sawed out between the letters and figures, and the edges and borders are then finished with small files. Tooling the surface of the letters or background adds richness, but considerable skill in the use of a graver is necessary before good work of this kind can be done.

The tools required for work of this kind are a small hand or breast drill, a set of small drills, coping saw and blades, bench vise, files, dividers, and scribes for laying out the work. There is a wide field for such work, and with a fair degree of skill, it is entirely possible to build up a flourishing business in monogrammed watch fobs, belt buckles, radiator monograms for automobiles, monograms for leather handbags, and the like, without the investment of more than a few dollars for tools and materials.

Preventing Corrosion of Battery Terminals

Almost every motorist sooner or later experiences the annoyance caused by his starting motor failing to respond when the starter pedal is depressed. Many of these cases are caused by increased resistance at the battery terminals, as a result of corrosion from exposure to the

air and fumes from the battery. Cleaning the terminals relieves the trouble temporarily, but does not cure. Soldering is not advisable, because it interferes with the removal of the battery, should this be necessary, but the corrosion can be prevented by covering the terminal and lug with paraffin. To do this, a small paste-board box should be fitted over each terminal in such a manner as to cover completely the edges of the actual points of contact between the lug and terminal. Melted paraffin can then be poured into the box and allowed to harden. The contact surfaces should be thoroughly cleaned with emery cloth before the wax is applied. Should it be necessary to remove the battery for any reason, the wax can easily be removed.—C. M. Crouch, Minneapolis, Minn.

The Knight's Tour

The knight's move in chess can be made the basis of a very effective "memory" feat, suitable for presentation by any ama-

1	2	3	4	5	6	7	8	1	11	5	15	32	22	39	56
9	10	11	12	13	14	15	16	62	45	60	50	33	43	26	9
17	18	19	20	21	22	23	24	3	20	14	8	23	29	12	2
25	26	27	28	29	30	31	32	19	25	35	41	58	52	37	47
33	34	35	36	37	38	39	40	64	54	44	59	49	34	17	27
41	42	43	44	45	46	47	48	10	4	21	6	16	31	48	38
49	50	51	52	53	54	55	56	55	61	51	57	42	36	53	63
57	58	59	60	61	62	63	64	46	40	30	24	7	13	28	18

The Moves of the Knight in Its Tour around the Board are Outlined in the Left-Hand Drawing. This Trick may be Used with Telling Effect as a Master "Memory" Feat

teur magician. This move is a peculiar one, the piece moving two squares straight across the board, then one square at right angles to the first one, or one square straight across the board, then two squares at right angles; the first move may be in any direction, forward, backward, or to the right or left, except diagonal. The tour may begin at any square on the chessboard, the problem being to move the knight in such a manner that it will, in the course of the tour, cover every square on the board, without stopping twice on the same square, returning finally to the square from which it started.

A blackboard is ruled off into 64 squares, corresponding to the chessboard, and the squares are numbered as shown in the left-hand drawing; the board is placed on an easel in full view of the audience. This done, a member of the audience is asked to call out the number of the square he wishes the performer to

start from, which, for example, will be number 37. The person giving the number is furnished with a piece of chalk, and instructed to draw a straight line from square to square as the performer calls out the numbers. By examining the drawing, it will be seen that these straight lines, while not showing the actual right-angled move of the knight, show the starting and stopping points of each move.

The performer steps well away from and to the back of the blackboard, so that it is impossible for him to see it. As the numbers are called out the knight's path is traced until the piece is back at the starting point, in this case number 37 square.

The trick requires an indicator, which is a card, $1\frac{3}{4}$ in. square, divided into 64 squares, and each row numbered from left to right as shown in the right-hand drawing, the numbers representing the consecutive moves of the knight. Beginning with the number called, the consecutive numbers are read from left to right, then the numbers in the next row below, and so on, always reading from left to right, and when the last number, 18, is called, the performer goes to the upper left-hand corner and calls out number 1, continuing until number 37 is again reached.

When the performer steps away from the board, he casually folds his arms, so that the indicator is concealed in his right hand; it is then only necessary to glance down at the indicator and call off the number, beginning at 37, or any other number specified.

In working up the effect, the numbers should not be read off in too much of a hurry; for example, say, "You are on 37—go down—down to 47, now—away down to 64, in the corner,—up to—er—54, now to 44," and so on.

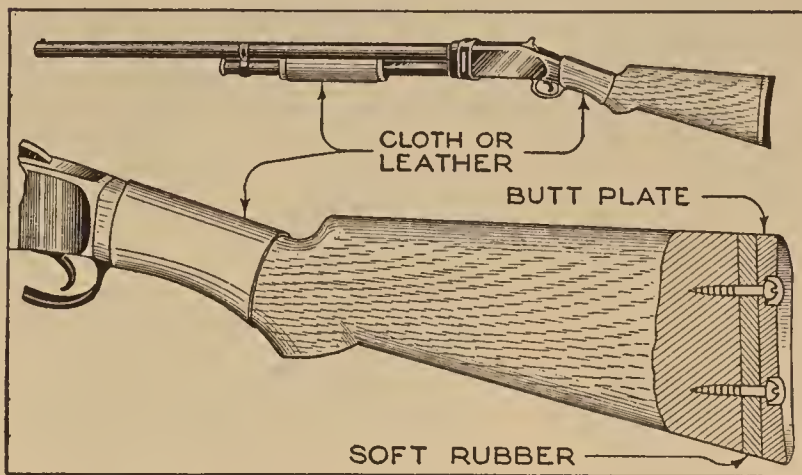
Properly presented, this trick gives the audience the impression that the performer has a master memory.

Making the Shotgun Comfortable

Many hunters and trapshooters would derive more pleasure from their sports if it were not for two drawbacks, which cause inconvenience even to experienced men. These are the recoil of the gun when discharged, and the cold hands the user gets if he is not equipped with gloves. Many cannot shoot with gloves on, and, even for those who can, shooting with gloves on is inconvenient because it does not allow the gun to be handled with the proper speed for quick shooting.

By covering the grip and forearm of

the piece with rubber or leather, the cold grip is eliminated, and the ability of the user to handle the gun quickly is not interfered with. By gluing the covering to the wood, the leather or rubber can be



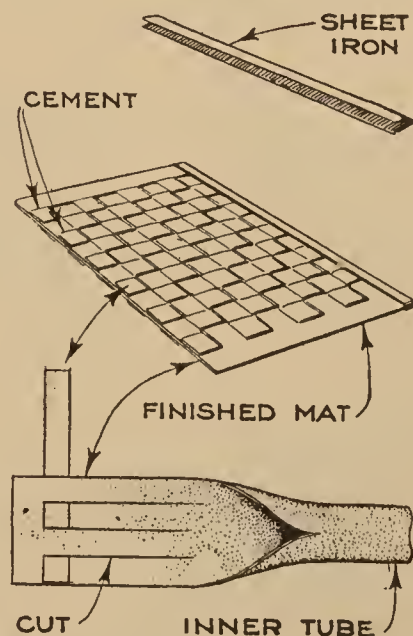
Two Methods of Making Hunting and Trapshooting More Comfortable for the Sportsman: Leather or Rubber-Covered Grips Prevent Cold Hands, and Soft Rubber between the Butt Plate and Stock Takes Up Some of the Recoil

removed at any time without marring the gun. The sharp and heavy "kick" resulting from the discharge of heavily loaded shells can be considerably reduced by removing the hard-rubber butt plate and inserting a piece of soft rubber between it and the stock. The rubber should be trimmed neatly so as not to project beyond the stock, and long screws should be used, to steady the butt plate.

Rubber Mat from Inner Tubes

A novel use for old inner tubes is shown in the drawing of a woven rug, or mat, that may be used as a covering for the floor of the car.

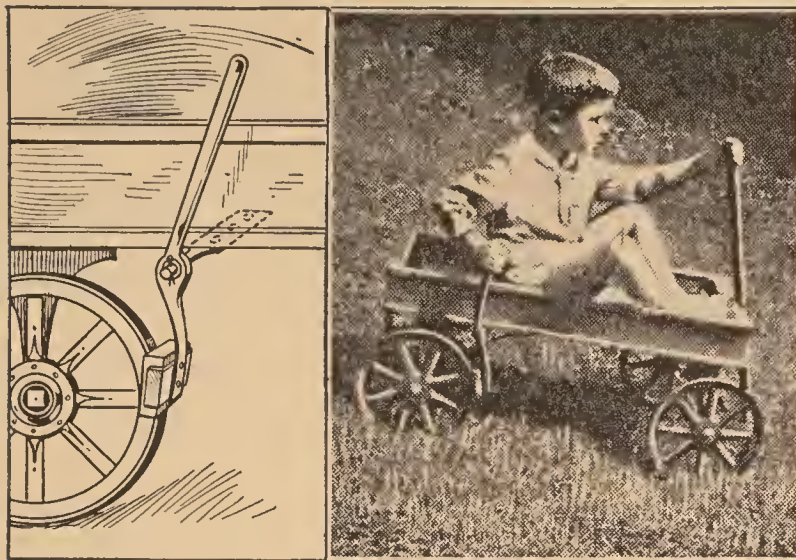
Two sections of inner tube, about $2\frac{1}{2}$ ft. long, are split lengthwise, and the rectangular pieces thus formed are slitted lengthwise, spacing the cuts equally and running them to within an inch or so of the ends. Another section is cut up into strips of the proper width and length and these are



woven through the slits, as indicated in the drawing. When both sections have been woven, the loose ends of the strips are fastened with a little rubber cement. If desired, two strips of sheet iron may be bent and clamped on the edges, to stiffen the mat.

Easily Renewed Coaster Brake

The brake that forms a part of most models of children's toy wagons and coasters of various kinds, is usually un-



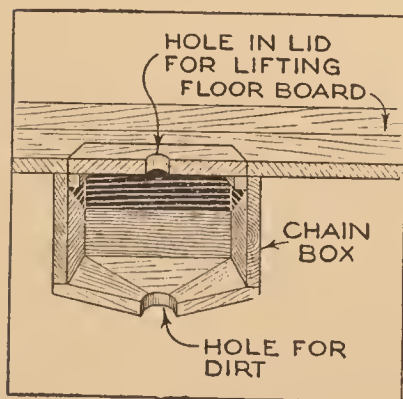
A Hand Brake for Children's Toy Wagons and Coasters, in Which Provision is Made for Renewing the Brake Shoe When It is Worn Out

satisfactory because of its short life. The wooden lever wears down rapidly, and an iron brake wears the tires, and there is usually no way to renew either.

The drawing and photograph illustrate an iron brake handle that has provision made at its lower end for holding a wooden-block brake shoe, so that as soon as there is any amount of wear, a new block can be inserted, and the brake will be as good as new. The brake lever is forged from a piece of round iron, with one end flattened to accommodate the brake-shoe holder, to which it is riveted. The brake lever is fastened to the wagon by means of a stud attached to the underside of the wagon box.—C. R. Gains, Colfax, Ia.

Compartment for Tire Chains

Muddy tire chains are not easily cleaned, and mess things up generally when thrown into the tool box of a car, but this trouble can be completely overcome by providing a special box for them fastened underneath the floor boards, and so mounted that it will clear the



driveshaft and other parts of the car. The bottom of the box should slope down toward the center, in which a hole is drilled to allow the dirt to fall through. Access to the chains is gained by lifting off

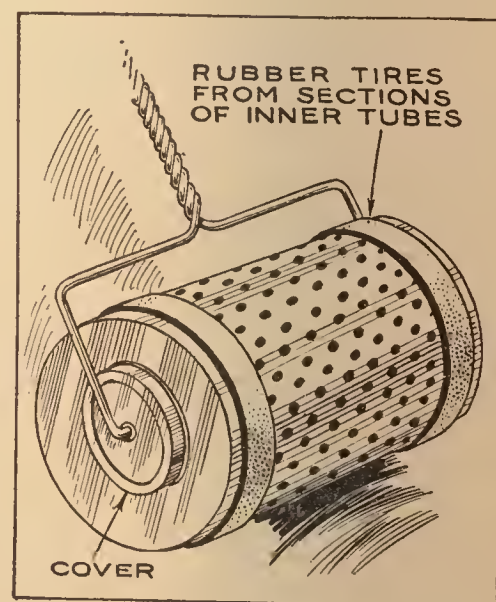
the cover, which is provided with a finger hole. With an arrangement of this character, the muddy chains can be dropped into the box and forgotten until needed again, when they will be found clean and ready for service. As the mud dries, it is shaken off the chains by the vibration of the car, and soon finds its way through the hole in the bottom of the box.

Camera Shutters should Not be Oiled

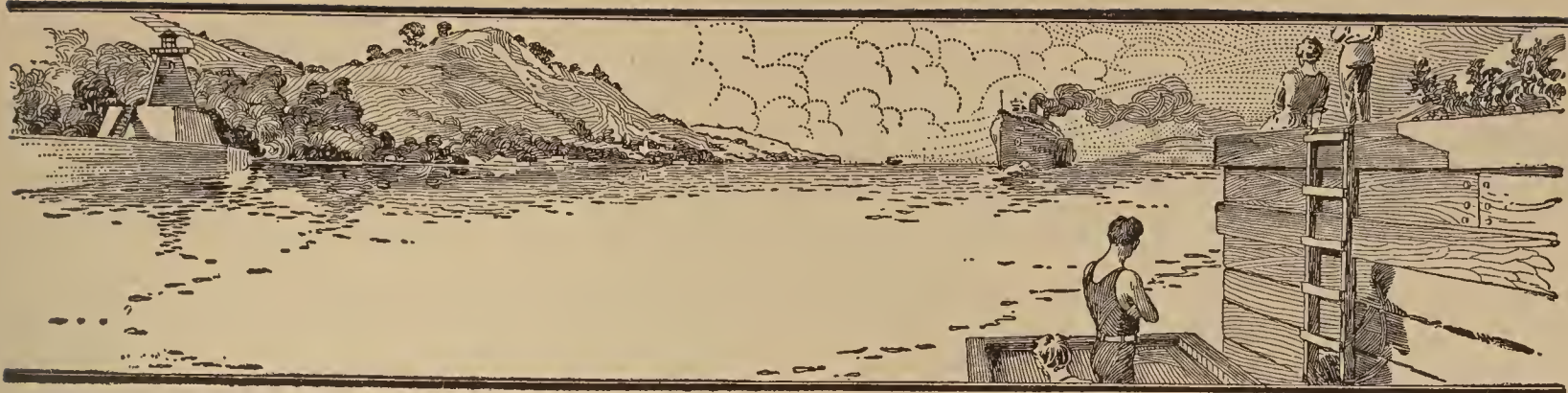
One of the surest ways of putting a camera shutter out of commission is to oil it. The fact that a watch needs oil does not indicate similar need on the part of the shutter. The construction of the camera shutter differs greatly from that of the watch. It has comparatively few bearings and these operate only when the shutter is opened or closed, and they are designed to work wholly without lubrication; consequently, if oil is introduced into the bearings of a shutter it will seriously interfere with its working. By remembering these facts and never oiling the shutter on a camera, it will, if protected against dust, moisture, and physical injury, render good service for many years.

Sweeping-Compound Distributor

To reduce the amount of sweeping compound required, and to apply it uniformly, the handy device shown in the drawing can be used to advantage. The container for the compound is made from a 2-gal. sirup can, the sides of which have been perforated with $\frac{1}{4}$ -in. holes. The detachable handle is made of



twisted wire, the ends of which fit into holes punched through the centers of the top and bottom of the can. To elevate the can a sufficient distance above the floor to allow the compound to sift through, and to provide silencers, rubber tires, made from cross sections of old inner tubes, are slipped over the ends. The cylinder is filled with compound by removing the handle and cover.



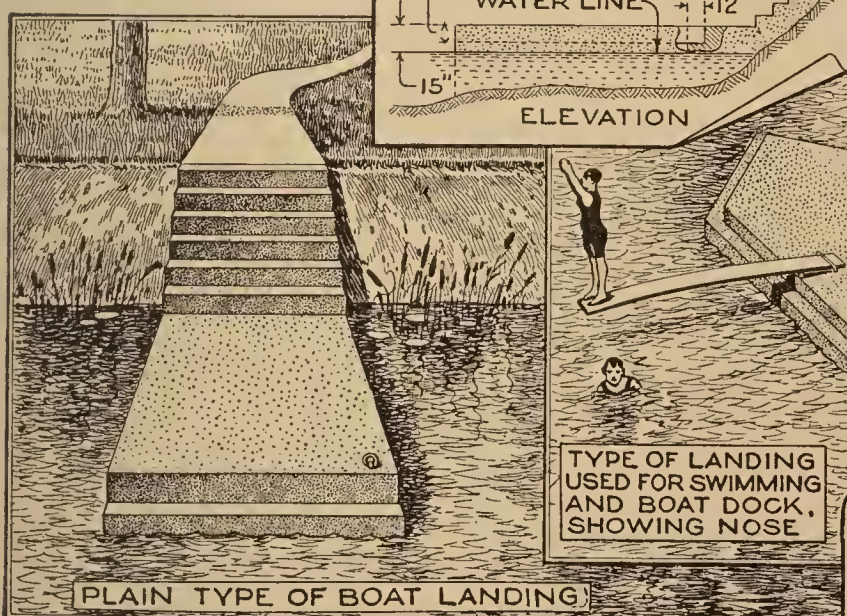
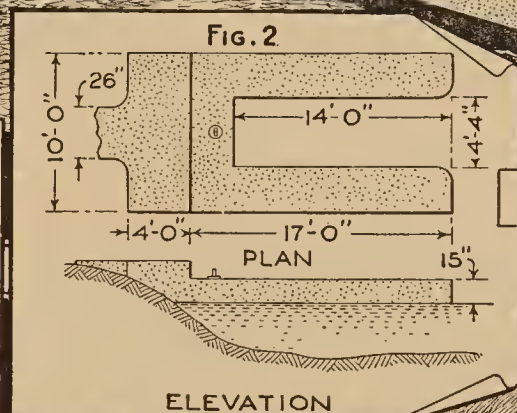
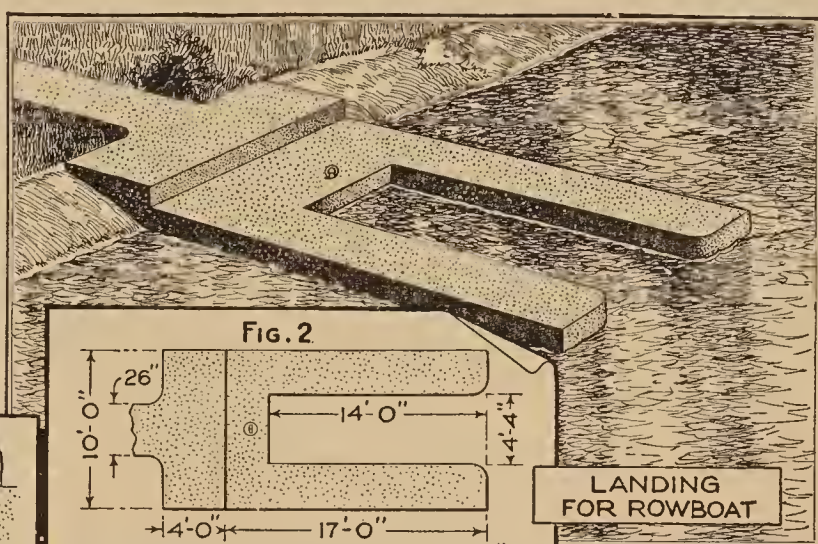
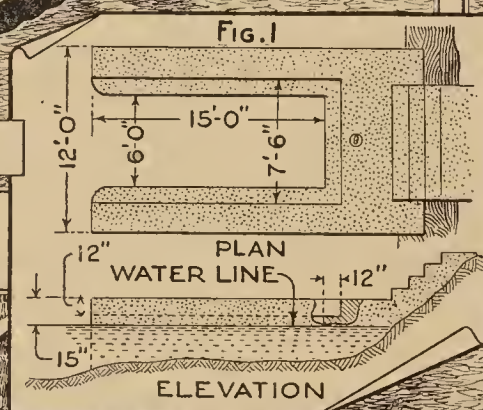
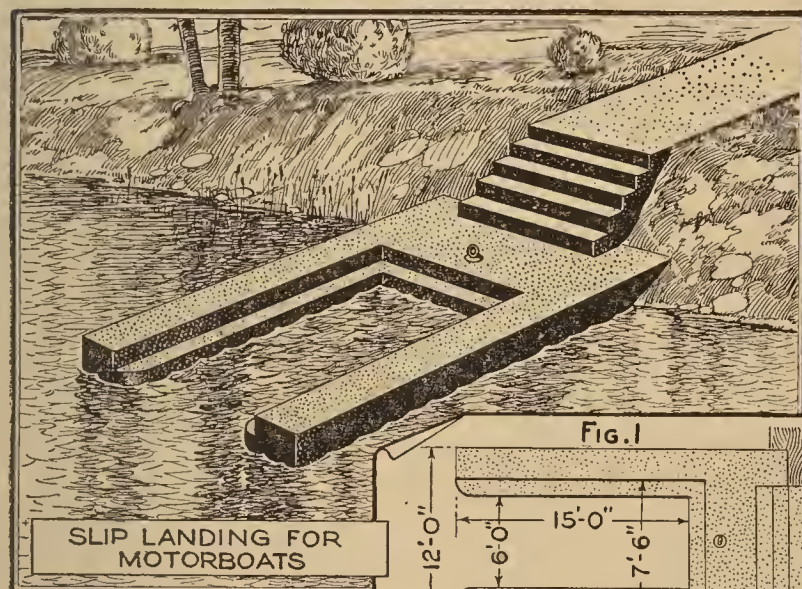
Concrete Boat Landings and Docks

By JAMES TATE

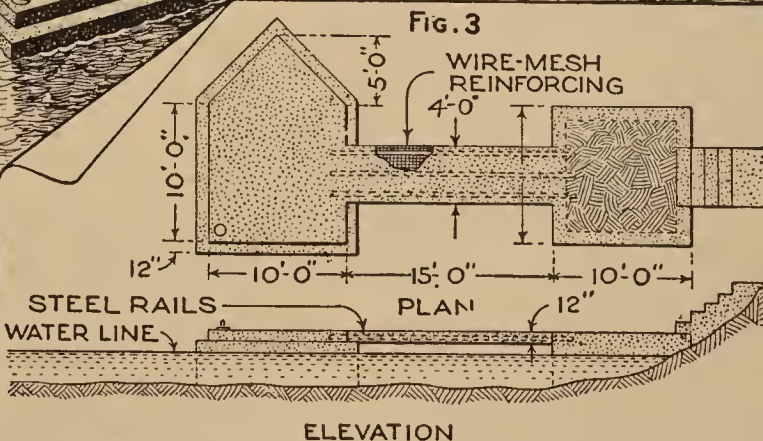
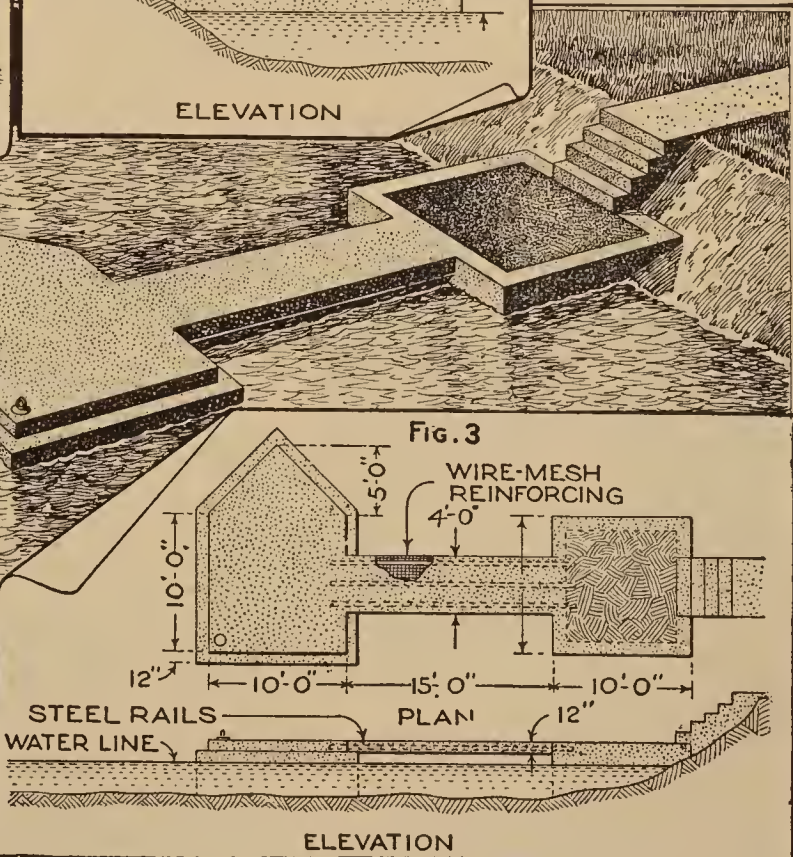
A BOAT landing at the summer home, or resort, is something that is frequently lacking, and in most cases where one exists, it is, as likely as not, a rickety structure supported on a few half-rotted posts. Such a landing is not only unsafe but unsightly, requires frequent repairs.

will be required to build the necessary wooden forms, but once constructed, the job is practically everlasting, and repairs are seldom if ever necessary.

The drawing shows four types of landings and docks; dimensions are given for three, and all are suitable for the accom-



TYPE OF LANDING USED FOR SWIMMING AND BOAT DOCK, SHOWING NOSE



Concrete Boat Landings Never Become Rotten like a Wooden Structure, Seldom Need Repairing or Rebuilding, and Are Practically Indestructible Unless Carried Away by Ice or Flood

and, from time to time, rebuilding. The disadvantages of wooden structures cannot, however, apply to a boat landing made of concrete. A little more work

moderation of the average small boat. Neither the style nor dimensions given need be adhered to, of course, but can be altered in any way desired.

In the construction of a boat landing, as well as in the building of any other monolithic structure, a form is required to contain the concrete mixture until it sets. A form for the construction of work of this character is made by driving boards or sheet piling into the bed of the stream, to form a hollow, into which the concrete mixture is poured and tamped. In making the form, care should be taken to have it well braced, so that the weight of the concrete will not force it apart. Also, the boards forming the sides of the form should be close enough together to prevent a free flow of water through the form, as this would have a tendency to wash away the cement binder, leaving an imperfectly bonded mass consisting largely of broken stone. It does not make any particular difference whether or not there is water inside the form; if it can be pumped dry, all the better, but this is not necessary. The concrete will harden under water, although at a slower rate than when exposed to the air.

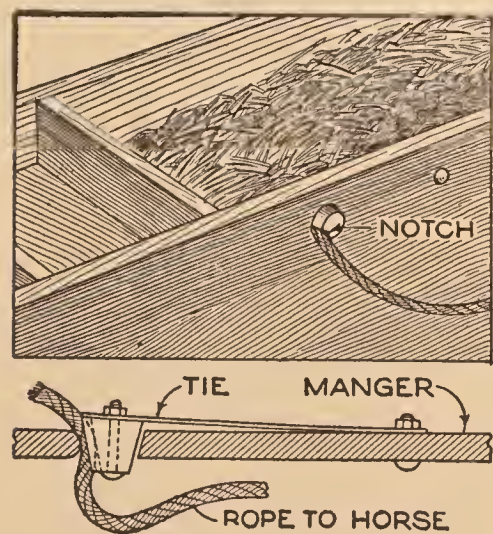
The mixture for work of this kind should consist of at least 1 part cement, $2\frac{1}{2}$ parts sand, and 5 parts of crushed stone or screened gravel. A little more cement than the above quantity will not hurt, however. All the ingredients should

be thoroughly mixed before adding water, and when the water is added, the mass must be mixed again until every stone and grain of sand has its coating of cement. In this manner the strongest possible mass will be obtained once the cement has set or hardened.

The estimated materials required for landings of the style and dimensions shown are: for Fig. 1, cement 38 bbl., sand $14\frac{3}{4}$ cu. yd., and stone 29 cu. yd.; and for Fig. 2, $33\frac{1}{2}$ bbl. cement, 12.8 cu. yd. sand, and $25\frac{1}{2}$ cu. yd. of broken stone. The plain type of landing shown in the lower left-hand corner is built to meet individual requirements, and no dimensions or estimate of materials are given. The rather elaborate style of Fig. 3 is built in two parts, which are connected by means of a reinforced runway above the water line. The nose of the outer pier is pointed upstream to break up floating blocks of ice, and the inner pier is cast hollow, being afterward filled in with well-packed earth. The materials required for this landing, built to the dimensions given, are cement $46\frac{1}{2}$ bbl., sand 18 cu. yd., crushed stone 35 cu. yd., woven-wire mesh, 3 sq. yd., and old steel rails, 60 ft. Eye-bolts and rings, for tying the boats to, are imbedded in the concrete as shown.

Automatic Stock Tie

Although the knotted rope is the oldest tie for stock at the manger, it is not always the most convenient, for, with mittened hands, it is difficult to tie the clumsy rope into a knot that will hold. Again, as the rope becomes worn at the knot, it breaks at that point before the



remainder of the rope shows appreciable wear.

To save the rope and make the tying and untying practically automatic, the device shown in the drawing can be made and attached to the man-

ger. A hole is drilled in the front of the manger and a plug is made, so tapered that its larger diameter will just fit into the hole. A notch is cut in one side of the plug to hold the rope, and a strip of ash, or some other springy wood, is used

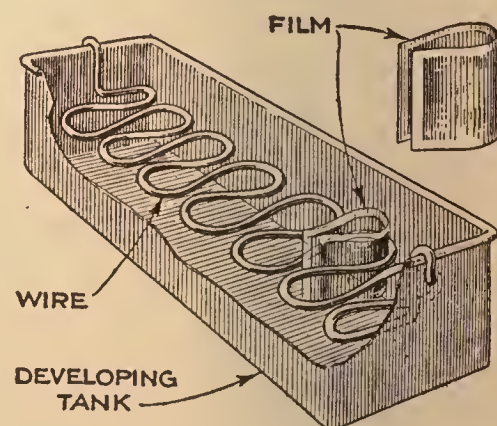
to attach the plug to the manger by means of a bolt, as indicated. To make the rope fast, it is simply passed through the hole by pushing in on the outer end of the plug. The animal is released by pushing the plug the same way and pulling out the rope.—Geo. G. McVicker, North Bend, Neb.

Developing Holder for Cut Films

The drawing shows a film-holding device used when developing the individual

films of a film pack. The holder is made from a single strip of brass, aluminum, or galvanized wire, formed into a number of loops into which the

films are inserted in the manner indicated. The ends of the holder are bent upward, and a hook is formed in the extremity for suspending it from the edges of the tank containing the developing solution.

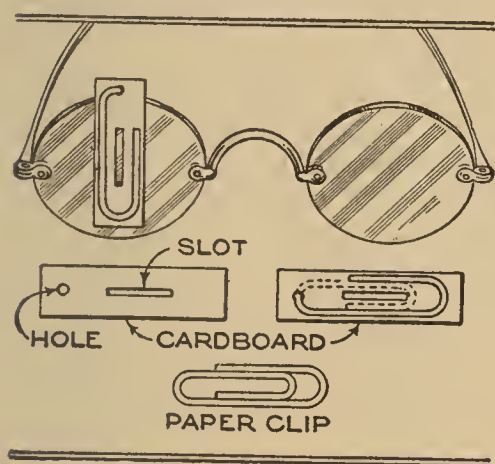


Removing Tight Screw Caps

When the screw cap of a fruit jar, or similar container, refuses to move, the following plan is frequently successful in getting it started: Get a strip of sandpaper, twice as wide as the screw top and long enough to reach entirely around it. The sandpaper is folded lengthwise of its center, with the abrasive side out, placed around the outside of the cap, and tied in place with a stout string. Pass the cord around several times, drawing it as tightly as possible, and end it in a loop. Into this loop a stick, or similar lever is inserted, the end of which, pressed against the top, provides sufficient leverage to loosen it.

Attachment for Glasses Aids Marksman

The elderly marksman, on account of changing eyesight, often finds himself handicapped by the limitations of focus.



If he uses glasses to overcome a tendency to farsightedness, the target and front sight are clear, but the rear sight is more or less indistinct, and if "nearsighted" glasses are

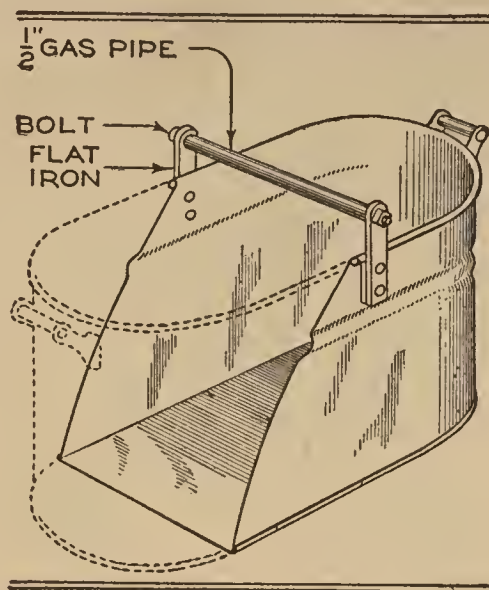
used, the target and front sight are blurred while the rear sight is clear and sharp. The little device shown in the drawing, which one sharpshooter has found eliminates these troubles, is made from a narrow piece of cardboard having a narrow slot cut in the center; it is held to the lens of the "sighting" eye by a wire paper clip.—J. G. Brown, Evanston, Illinois.

A Water Popgun

The only thing needed to make a safe and sane popgun is a cork large enough to fit tightly into the end of a length of garden hose after the nozzle has been removed. The hose is connected to the faucet and, aiming the cork as desired, the water is turned on; this compresses any air that may be inside the hose and causes the cork to be expelled violently, with a considerable "pop."—Everett Gordinier, Denver, Colo.

Grain Scoop Made from Washboiler

There are many times during the year when a scoop such as that illustrated will be found very useful around the farm. For filling grain sacks it is faster than the scoop shovel, there is less danger of spilling, and it is also used with good effect in handling grain in other ways. The dotted lines show the part of the boiler which

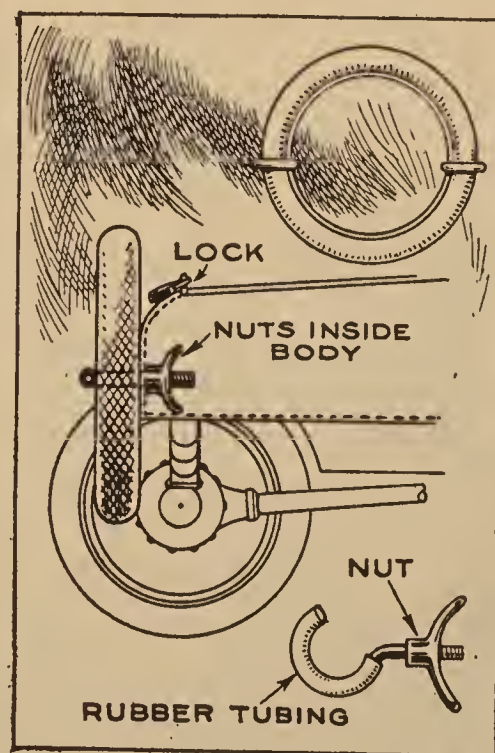


is to be cut away; the cutting should be done carefully, and, if desired, the edges may be beaded over a piece of stiff wire, which will make the scoop stronger and eliminate sharp edges. Two pieces of flat iron are riveted to opposite sides of the boiler, just back of the cut, and a piece of pipe is fitted between them to form a handle, a long bolt being used to hold it in place. When partly filled, the scoop can be carried by the pipe handle like a pail.

Brackets for Spare Tire

The form of tire bracket shown in the drawing is made from short lengths of iron or steel

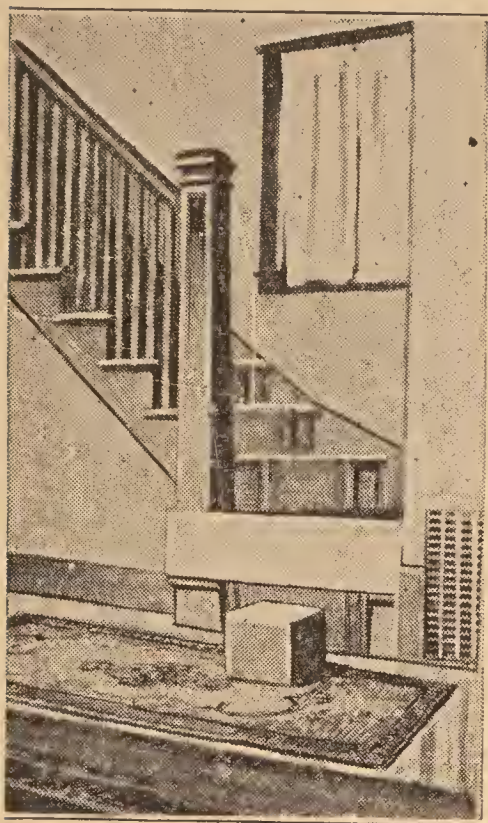
rods, bent into shape, and threaded at one end to take a suitable wingnut. The clamps are covered with rubber tubing to prevent chafing. When attached to the back of the deck of a roadster, and the cover locked down, the tire is



practically secure against theft. To remove the tire it is only necessary to loosen the nuts and turn the clamps to one side.

Making the Stairs Safe for Baby

To keep the baby from climbing the stairs until he can do it safely and without the usual danger of falling back, to



the consternation of the household and possible injury to himself, the false step shown in the photograph provides an effective barrier to the infant's progress.

The step is built to conform as closely as possible in appearance to the rest of the woodwork, and when placed on the

lowest step, leaves no foothold for the baby. When in position, the barrier is held in place by screen-door hooks, and when the child is large enough to climb over the obstruction, he can be safely trusted to go the rest of the way upstairs. The small box in the foreground of the picture is for the other members of the family, and is so small that the baby cannot get on top of it.—Uri V. Averitt, Gary, Ind.

Using Cheap Flashlight Batteries

Among the small types of pocket flashlights, the most popular is the 1½ by 3-in. two-cell flat case, in which both cells are side by side. Both cases and batteries of this size are sold in large numbers through novelty and five and ten-cent stores. By knowing how to fit the cheap batteries into the case properly, they may be used with results comparable with those obtained with the higher-priced ones. The cheap batteries are sold at a low price largely because they are not so accurately made. It will usually be found that, when inserted in the case, the cheap battery will rattle loosely, and this frequently results in short-circuiting the contact springs of the battery, either directly to the case, or through the lamp. When this happens, the battery rapidly discharges, and the owner may never know why his battery suddenly goes dead.

After some experiences of this char-

acter, the idea of wrapping the new battery with strips of gummed tape to make a fairly tight fit in the case occurred to me. Since that time my cheap batteries have had a long life. It is, of course, also necessary to bend the battery springs so as to get the right tension and contact with the switch, but this bending does not insure satisfaction unless the battery is "padded out" to fit the case properly. Where this fitting is properly done and the usual attention given to tensioning the springs, most of the ten-cent batteries will give satisfactory service.—Curtis Ralston, Chicago, Ill.

Preventing Theft of New Tires

The general custom of carrying new automobile tires in the tire rack of the car as "spares," instead of mounting them upon the wheels and getting mileage out of them, is responsible for many tire thefts. Even when they are protected by a chain and lock, an enterprising thief can find ways and means to open the lock or cut the chain; the best way to foil him is to put the new tires on the wheels and carry the old ones as "spares." A new tire is much more easily disposed of by the thief than an old one, and as the thief reasons that the old one is probably of little value, he passes on to find a car attractively baited with new tires.

Chemical Crusher Made from Spoon

Photographers who mix their own chemicals frequently find it necessary to crush some of the crystals in order to



make them dissolve rapidly, and the same is true of amateur chemical experimenters. The photograph shows how an ordinary ice-cream-soda spoon, one of the long-handled variety, can be made into a very effective

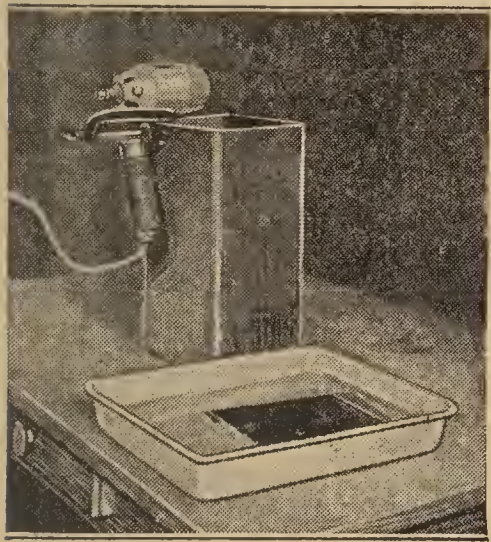
crusher, which, unlike glass crushers, is unbreakable. It is only necessary to bend the spoon bowl at right angles to the handle so that the bottom of the bowl is downward.

Bottle Caps Make Good "Metal Lath"

The proprietor of an amusement resort makes it a point to gather all the soda-water bottle caps which are left scattered around by picnickers. There are several reasons for this, the main one being that the caps, concealed in the grass, dull the edge of the scythes. The second reason for gathering the caps is that they may be nailed to the sides of small buildings, serrated edge out, with a shingle nail through the center, and form a good foundation for a coat of cement stucco. From 12 to 24 of the caps are needed to cover a square foot of surface.—John Mignone, Spring Valley, Ill.

Agitating Negatives during Development

Tray development of photographic negatives has one advantage over the method of developing the plates in a tank, as the tray can be rocked and the developing solution agitated. However, time is often limited, and it is desirable to develop the negatives in a tank. The photograph shows a method of developing



oping the plates in a hard-rubber or vulcanite tank in which the developing solution is agitated by a massage vibrator, which is clamped to the side of the tank with an ordinary C-clamp. Care should be used that the clamp is not screwed up so tightly as to break the tank.—Thomas Allen, Flushing, N. Y.

"Art" Glass as Showcards

Squares of so-called "art" glass, opal, ruby, or other color, can be used as showcards in stores and display windows. They are lettered in the usual manner with water colors or showcard colors; then, when a new card is needed, the paint can be washed off and the new lettering applied. Green or brown art glass, which is also called "cathedral" glass, "pot metal," and other names, held in a harmonizing frame, makes a very attractive sign which will save the continual expense of Bristol-board cards.

Heater Made from Auto Headlamp

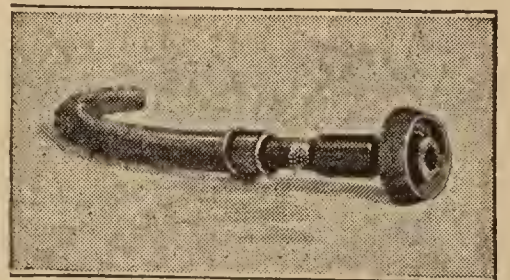
The photograph shows an electric heater that was made from a discarded automobile headlamp. The heating element from a standard heater was bought from an electrical-supply store, inserted in the position occupied by the bulb, and the electric wires led out through a porcelain tube placed in the hole previously occupied by the lamp receptacle. A circular piece of copper screen in place of the headlamp lens prevents anything from coming into contact with the red-hot heating coil. The base of the heater is made from an old automobile-hub flange to which flat-iron supports are fastened, the latter being attached to the heater so that it can be tilted at practically any angle.—A. F. Willey, Jr., Grand Rapids, Mich.



Forcing Obstruction from Drain Pipes

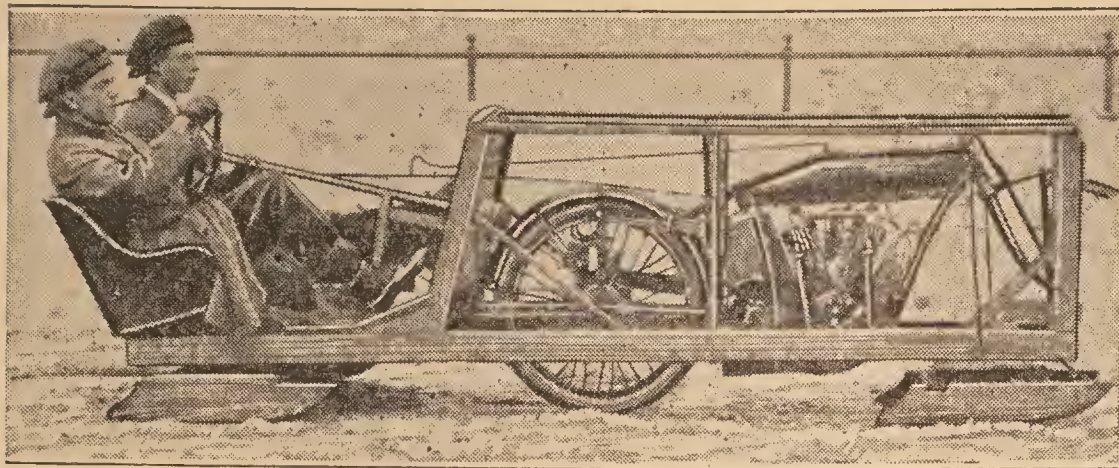
Bathtub and similar drain pipes will become clogged at times, and it is frequently found that the ordinary suction cup will not dislodge the obstruction. The photograph shows a device which has been successfully used for opening up drain pipes with water pressure, and that, unless the stoppage is caused by a hairpin or similar article, usually clears the pipe.

An ordinary rubber bathtub stopper has a hole cut through its center, into which a piece of $\frac{1}{2}$ -in. pipe is inserted and held by a nut on each side of the stopper. A suitable length of garden hose is slipped over the end of the pipe and fastened securely with wire, or with a regular hose clamp. In use, the rubber stopper is placed in the drain pipe, the hose is then attached to a faucet and the water turned on, forcing the obstructing matter through the pipe.—W. S. Standiford, Youngstown, Ohio.



A Motorcycle Bobsled

Most motorcycle owners put their machines away when the snow begins to



Instead of Storing the Motorcycle during the Cold Winter Months, It is Used, in This Case, to Drive a Bobsled: the Front Wheel and Handlebars are Removed, and the Machine is Held Upright in a Wooden Framework

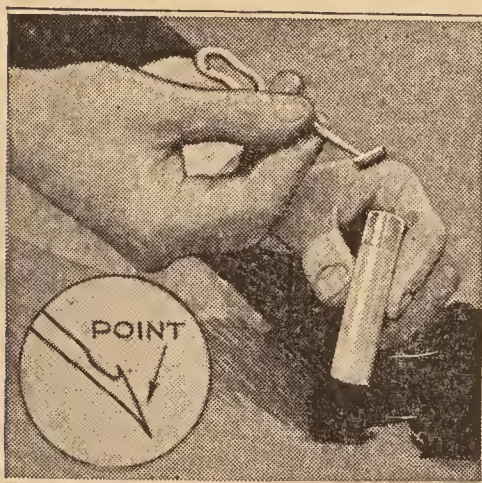
fly, and forgo their use during the winter months. However, the photograph shows how one enthusiast constructed a bob-

sled that uses the motorcycle power plant to drive it along the frozen surface.

The front wheel and handlebars are removed from the machine, which is held vertically in a framework built as part of the sled body. The front fork is firmly fastened, and the rear wheel is placed between two guideboards, so arranged as to prevent the walls of the tire from rubbing against the sides. An old tire was used on the single wheel, and additional traction obtained by the use of a tire chain. The sled is steered by means of a steering wheel operating the front set of runners, which swivels on a pin at the center.—S. E. Gibbs, Colfax, Ia.

Cork Extractor Made from Buttonhook

An ordinary buttonhook, such as can be obtained from any shoe dealer, is easily converted into an effective imple-



ment for removing thin corks and cardboard caps from bottles and tubes. In making the extractor, the hooked end of the buttonhook may be either cut off or straightened out. A

barbed point is then formed on the end, either by filing or grinding.—John H. Schalek, Pittsburgh, Pa.

Safety in the Use of Electric Lamps for Heating

It is a quite common practice to use electric lamps for heating purposes, but the misuse of them is also very common, and may lead to serious consequences. It should be remembered that if conditions are such that the heat cannot be dissipated, a fire may be started.

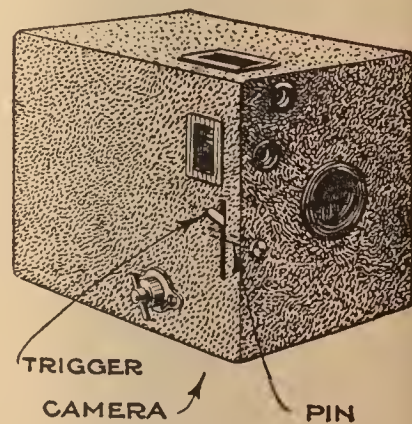
An ordinary 25-watt electric lamp, burning under normal conditions, is entirely too hot to be put, with safety, into a rubber boot to dry it. If such a lamp at the end of an extension cord is placed in a bed to keep a person's feet warm,

and bedding is piled over it, there will be little chance for the heat to escape, and it will almost certainly char the bedding within a few hours—possibly set it on fire.

When lamps are used for these or similar purposes, although such a misapplication is not recommended, the best and safest way is to employ bulbs of twice the voltage of the service current, for instance, a 220-volt lamp on a 110-volt circuit. These "oversize" lamps will generally give sufficient heat without becoming dangerously hot. Another way to accomplish the same result is to use two lamps in series, as by connecting two 110-volt lamps in series on a 110-volt circuit.

Safety Catch for Box Camera

Everyone who has carried a camera of the fixed-focus box type in a crowd, has been afraid that some one might accidentally rub against the trigger and expose the film so that the next picture taken on the same film would be worthless. By drilling a $\frac{1}{16}$ -in. hole in the position indicated by the dotted lines and inserting a wire pin or small nail back of the trigger, the trigger cannot be moved and the lens uncovered until the pin is withdrawn.—Chas. N. Shaw, Jr., Oxford, Ga.

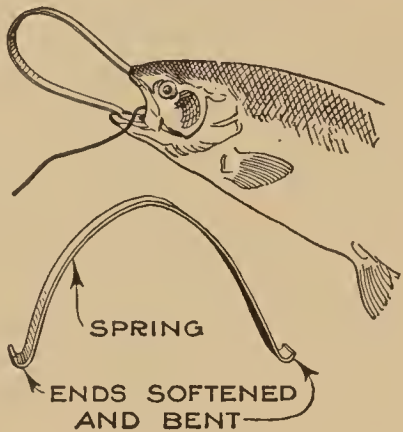


Emergency Oilstove Wicks

During the war, the owner of an odd make of oilstove was unable to obtain wicks, as the manufacturers had closed their factories. In the emergency, a stove dealer suggested that heavy outing flannel might be used to advantage for making wicks. The strips of flannel were cut to the exact size of the original wicks, and the edges were brought together and sewed by "overhanding," so that there would be no lap at the joint. Although these wicks did not last as long as the regular ones, it was at least possible to keep the stove in use.—Mrs. James Doremus, Passaic, N. J.

Releasing Hook from Fish's Mouth

It is often quite difficult to take the hook from a fish's mouth, because the teeth or scales of the fish make the undertaking disagreeable, if not one of possible injury. In such cases a simple tool like the one shown in the drawing will be of great assistance. Obtain a piece of corset steel, or clock spring, about 8 in. long, and grind the ends round. Soften the ends in a flame, and bend them back so as to form hooks, then reharden the steel by dipping it, still heated, in water. Bend the steel into the shape shown, so that the ends will be about 4 in. apart.



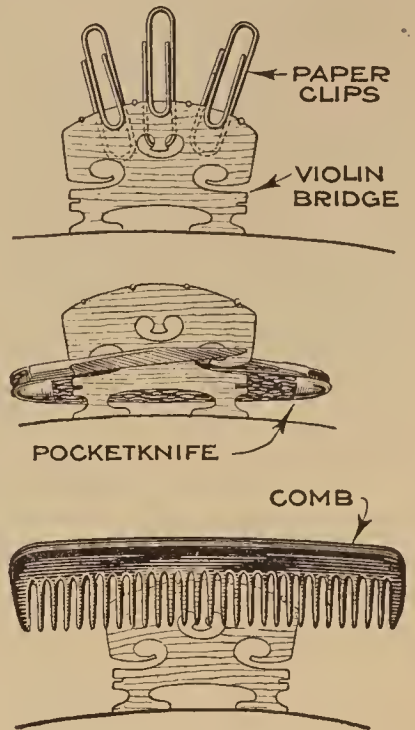
When a hook is caught in the fish's mouth, insert the ends of the tool in the mouth by pressing the ends together, then release them, and the tension of the steel spring will force the jaws apart so that the fisherman can get at the hook with both fingers.—L. B. Robbins, Harwich, Massachusetts.

Old Propeller Used as Anchor

Not having a regular anchor at hand, a motorboat owner picked up an old propeller, put a long bolt through the shaft hole, and tied it to the boat by a length of rope. By dropping this overboard, it is easy to anchor the boat, as the propeller blades catch in the bottom of the stream or lake as readily as the flukes of an anchor.—John Y. Beaty, Chicago, Ill.

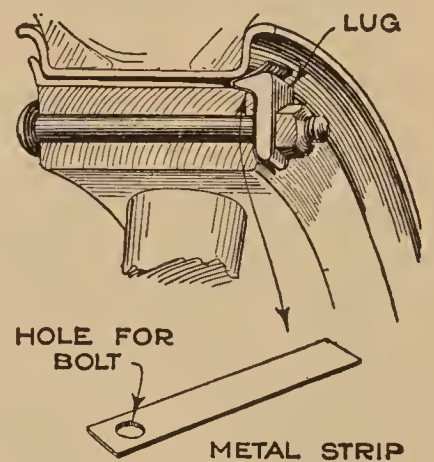
Muting the Violin

Three original ideas for muting a violin in the absence of a mute of the ordinary type, are shown in the drawing. Three ordinary wire paper clips, slipped over the upper edge of the bridge between the strings, are quite effective in softening the instrument's tone. They cost next to nothing and can be carried tucked away in the pocket. A pocket-knife may be used as shown, one of the blades being opened and the knife then closed around the lower part of the bridge in such a manner that the weight of the knife is supported entirely by the bridge. The third example shows the application of an ordinary comb, which is slipped over the strings, and thus reduces the volume of sound.—Henry O'Connell, New Haven, Conn.



Stopping Noise in Demountable Rims

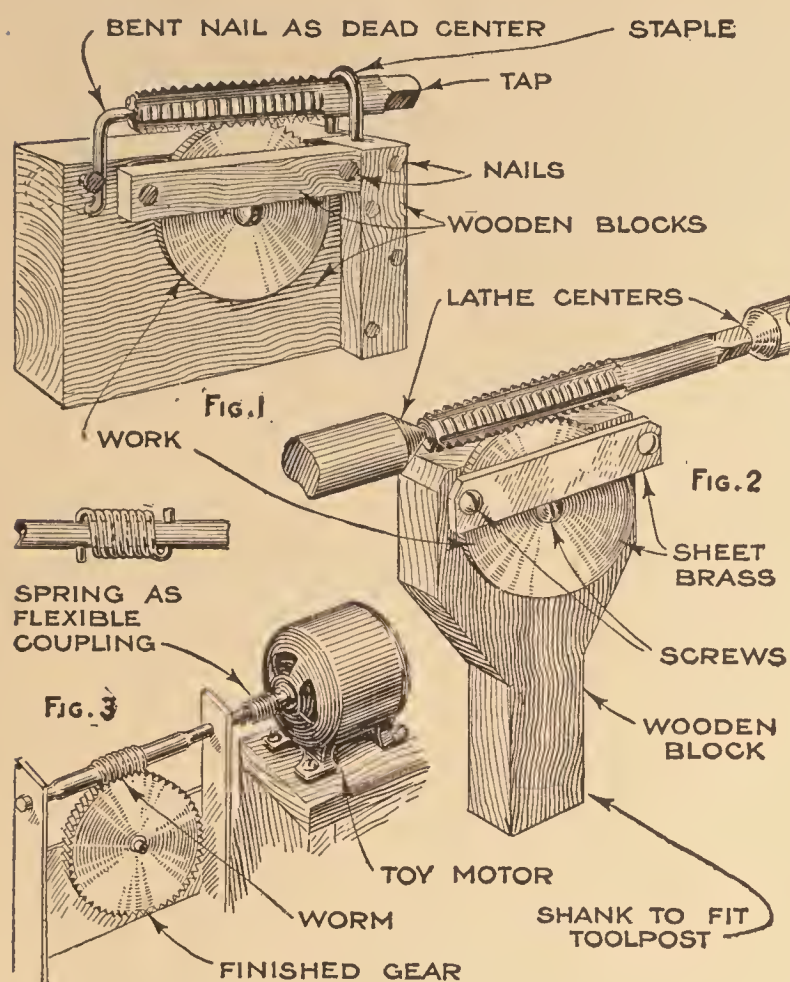
Demountable rims often squeak in an annoying manner, in spite of efforts to tighten them by various means or to remedy the trouble by the application of oil. This noise often arises from the fact that the bolt heads pull into the rim of the wheel so that the lug fails to grip the steel rim tightly. An effective method of ending the trouble



is to take some pieces of rather heavy sheet metal, about the same width as the lug, and bend them as shown in the drawing. A hole large enough to allow the strip to slip over the bolt is drilled or punched at one end. The strips are then placed over the offending lugs, which are screwed down in the usual manner with the metal strip projecting between the lug and rim. This will take up the play and usually eliminate the noise.—G. W. Greene, Madison, Wis.

Worm Gears for Toy Machinery

Every youngster who owns a small battery motor delights in rigging up hoists, mills, and all manner of "machinery" for



Two Fixtures are Shown for Cutting Small Worm Wheels; the First Is for Use by Hand and the Second with a Lathe. The Last Picture Shows How the Worm Drive is Connected

the motor to drive. As these motors necessarily run at high speed, and have only a very small torque, or turning force, it is always necessary to have some sort of speed-reduction gear, usually a system of large and small pulleys carrying strings as belts. A better arrangement is to use worm gearing, and the fine thing about this is the fact that a speed reduction of 100 to 1 is just as easy to obtain or perhaps easier than a 10-to-1 reduction. And as the speed is much reduced, the turning force is greatly increased, so that a very small motor will, when provided with a worm-gear drive, operate mechanism it could not even turn by means of the strings running over small V-pulleys.

In worm gearing the driving member or "worm" is nothing but a screw; a special kind of thread is used on large screws made for the purpose, but this is not at all necessary for small worms to drive toys—any bolt or machine screw that has a good, full thread will do for the driving worm, provided that the proper gear, or worm wheel, to serve as the driven member can be obtained. The worm wheel must have a number of teeth equal to the

desired speed ratio, one with 50 teeth giving a reduction of 50 to 1, when used with an ordinary single-thread screw.

The only special tool needed for cutting worm wheels is an ordinary machinists' tap. It should be of some common size, such as $\frac{1}{4}$ -20, and the worm or screw must, of course, be of the same pitch, in this case, 20 threads to the inch.

Two methods of cutting the worm wheel are illustrated. Fig. 1 shows a fixture that can be made of three wooden blocks nailed together. A screw for holding the gear blank, a wire nail, and a large wire staple are the only other materials needed. Fig. 2 shows how the work is done in a lathe; any lathe having a cross-feed can be used. It may be remarked that although the shank of the wooden block may be held quite rigidly in the toolpost, some kind of bracing block will have to be wedged under the forward end of the block to prevent chattering.

The blank for the worm wheel is merely a disk of sheet brass or soft iron, with a hole in the center. It can be turned out of the sheet, or filed, if no lathe is handy. The diameter need not be determined accurately, unless the speed reduction must be exactly as it is desired. The rule for determining the diameter of the worm wheel is to multiply the pitch (distance between teeth) by the number of teeth wanted, and take $\frac{7}{22}$ of the result. Thus, for a 100-tooth wheel to fit a $\frac{1}{4}$ -20 worm, the diameter would be $100 \times \frac{1}{20} \times \frac{7}{22}$, or $1 \frac{13}{22}$ in. In practice, the diameter should be somewhere near $1 \frac{5}{8}$ in., the main thing being to get the disk as nearly round as possible. In the hand fixture, shown in Fig. 1, the feed is obtained by striking light blows on the heavy staple. The staple should at first be driven in just so far that the teeth of the tap scratch the edge of the blank. The tap is then revolved with a bit brace or wrench; when it has made 100 revolutions the blank will be scratched clear around. As the turning is continued, notice whether the tap teeth have worked into the scratches previously made, or are cutting new ones. If the latter is the case, apply a little pressure with the hand, backward or forward, on the blank, as the turning is continued and the tap is fed in with an occasional blow on the staple, so that the teeth will revolve in the grooves previously cut, and not cut double-pitch.

Figure 3 gives an idea as to how the motor is connected to drive the slow-speed shaft by means of the worm and wheel. There must be plenty of play between the worm and gear, as the simple

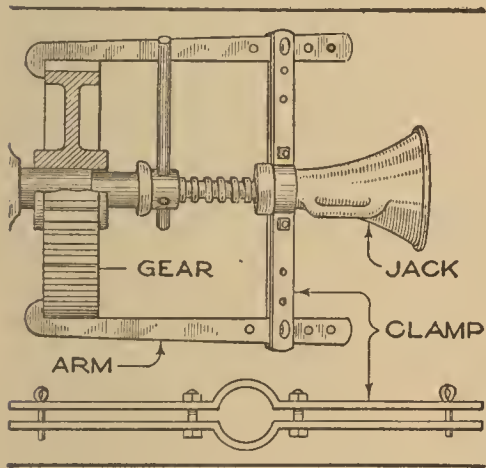
teeth of this type will not work well if pressed tightly together. The worm in Fig. 3 is made by turning, or filing down, a screw or bolt having the proper thread, so that journals are formed on the ends; the thread is also filed off for the sake of appearance, except at the center, where it meshes with the gear.

To Prevent Funnel from Tipping

A simple method of preventing a funnel from tipping to one side and spilling the liquid being poured, consists in slipping an iron washer over the stem; if desired, the washer can be permanently attached by soldering. This arrangement will be found particularly useful when both hands are required for pouring, as, for example, when filling the fuel tank of an automobile.

A Screwjack Gear Puller

Wherever gears or wheels are to be removed from their shafts, considerable damage may be done if the work is not properly performed, and, as gear pullers are not always available, or have not a



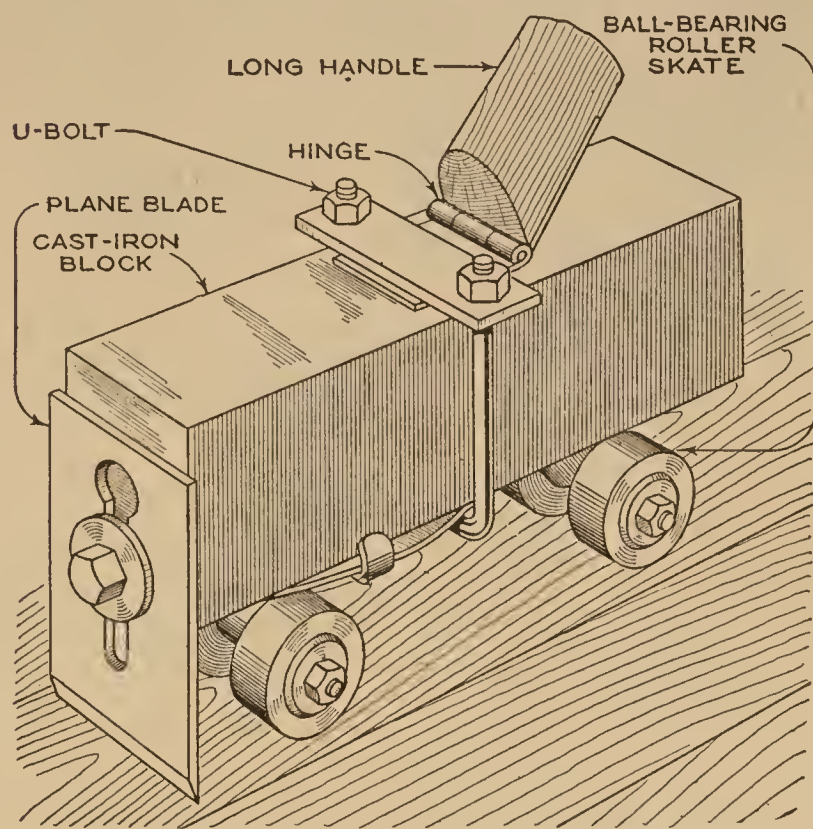
large enough range for the work to be done, the repairman is often tempted to resort to drastic methods to remove an obstinate gear. If a screwjack and a few pieces of flat iron are

at hand, they can be made into a powerful puller, thus removing the necessity of hammering the gear, with the attendant possibility of damage.

Two bars are shaped to fit around the top part of the jack standard, and drilled for clamping bolts; these bars should not be made from material lighter than $\frac{1}{2}$ by 2-in. steel. Holes are also drilled through each end of the crossarm thus formed, to take the pins which hold the pulling hooks. The hooks are cut from $\frac{1}{2}$ by $1\frac{1}{2}$ -in. stock, and are also drilled for the adjusting pins. With the hooks holding the wheel to be removed, and the head of the jack against the shaft, it is only necessary to turn the screw to exert pressure sufficient to pull off the wheel. Where possible, the hooks should pull against the gear hub.

Improvised Scraper for Hardwood Floors

A combination of a roller skate, plane blade, and a heavy block of iron makes a serviceable and efficient scraper for re-



A Scraper for Refinishing Hardwood Floors can be Made from a Roller Skate, an Iron Block, and a Plane Blade

finishing hardwood floors. This improvised scraper was made by an amateur workman simply by clamping the cast-iron block to the top of the roller skate. The plane blade was fastened to the forward end of the block by a screw and washer, for which a hole was drilled and tapped in the block.

A hinged handle was attached to the device by bolting one leaf of the hinge under the U-shaped clamp, which also serves to hold the iron block to the roller skate.

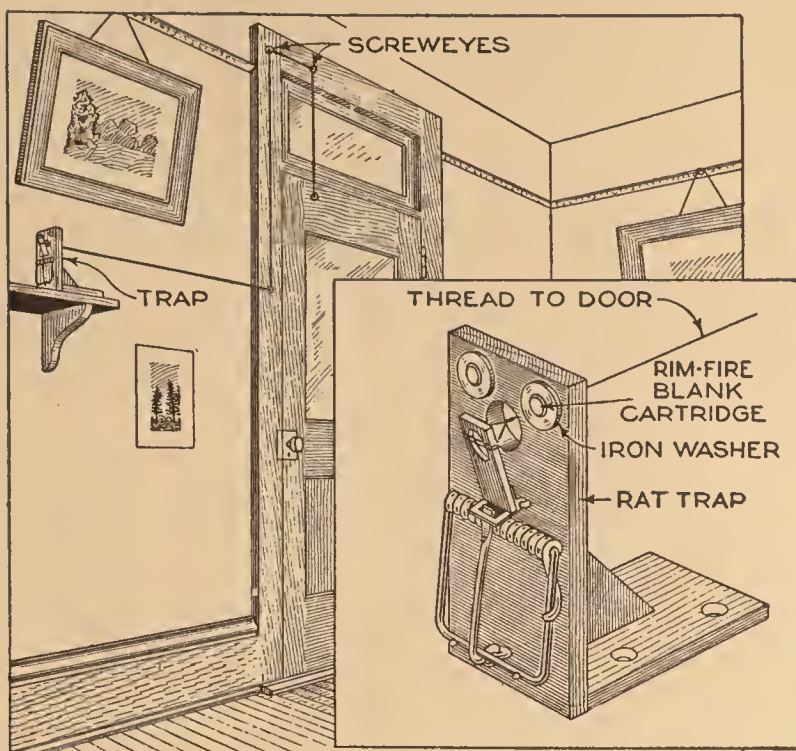
With the scraper shown, all the floors of a six-room house were resurfaced, the work being done with much more rapidity and ease than would have been possible by the hand-scraping method. The edge of the scraper blade should be beveled at an angle of about 30° , and the iron block should weigh about 30 or 40 lb. to get the best results.

Cure for Slipping Fan Belts

An automobile fan belt that is inclined to slip on the pulley, either because it is too loose or because the pulley is worn too smooth, can quickly be made to run true and take hold by lining it with adhesive tape the width of the belt. The adhesive tape is that used for bandages, and can be bought at any drug store.

A Burglar Alarm That Shoots

A burglar alarm that will fire blank cartridges, when operated by the entrance of an intruder, can easily be made at a



An Ordinary Spring Rat Trap, Converted into a Burglar Alarm, Shoots Blank Cartridges When the Door or Window to Which It is Connected is Opened

cost of but a few cents, from an ordinary spring rat trap. To convert the trap into a burglar alarm, it is only necessary to drill one or two holes in the base, into which .22-caliber blank cartridges are inserted, in such a manner that the spring of the trap will strike the rim of the cartridges and fire them. A hole is drilled underneath the trigger arm, and a thread or wire attached to the arm for releasing the trap. The burglar alarm is mounted on a base in the manner shown, the base being screwed down to the floor or shelf. The alarm is connected to the door or window by means of a stout thread or string, so that the door or window cannot be opened without giving an alarm.—Van Allen Lyman, Aromas, Calif.

Test for Water in Gasoline

The low specific gravity of most of the gasoline on the market makes it imperative that some caution be observed to prevent water from entering the supply tank. Chamois skin is frequently used, but this is too expensive to permit its common employment and is seldom at hand in emergencies. Cotton cloth will serve the same purpose if several layers are placed within the funnel to act as a strainer when the tank is being filled. Cotton is a powerful absorbent of moisture, and will remove all the water from the gasoline up to its point of saturation.

Care must be taken to see that nothing but cotton material is used.

A good test for determining the presence of water in gasoline is made by dipping a cotton cloth into a pan of the liquid. If the cotton remains damp after the gasoline has evaporated, there is water present in sufficient quantity to cause trouble in operating a gas engine or stove.

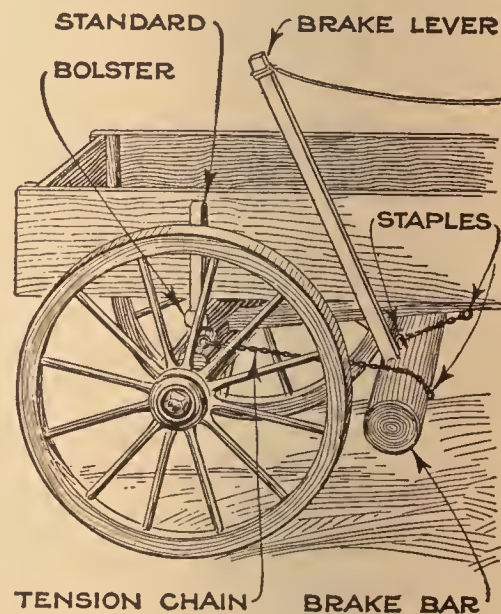
Preventing Wear on Copper Kettle

Having had considerable trouble in soldering a copper teakettle, that was worn through in several places around the bottom edge, means were sought to prevent this wear. This object was accomplished by soldering a ring of $\frac{1}{8}$ -in. copper wire around the bottom edge, thus preventing the bottom of the kettle from coming into actual contact with the stove, and preventing further wear.—Chas. G. England, Washington, Pa.

Mountain-Type Wagon Brake

A form of wagon brake which is more or less familiar in mountainous parts of the country produces a powerful pressure against the circumference of the wheels, and the speed of a wagon descending any grade which can be safely traveled is very nicely regulated.

A cylindrical brake bar is suspended, parallel with the axles, from the underside of the wagon gear by short chains, as in the drawing. The ends of the brake bar, which is made from part of the trunk of a small tree, should project 6 to 8 in. beyond the wheels on each side. A lever is inserted into the brake bar at one end so that the brake can be operated by the driver. When braking the vehicle, a forward pull on the lever brings the bar back against the wheels, and the amount of friction is controlled by the pressure exerted on the lever. When not in use, the brake hangs from the wagon gear out of contact with the wheels.—Louis Schneider, Clinton, Mo.



How to Make an Inlaid Checkerboard

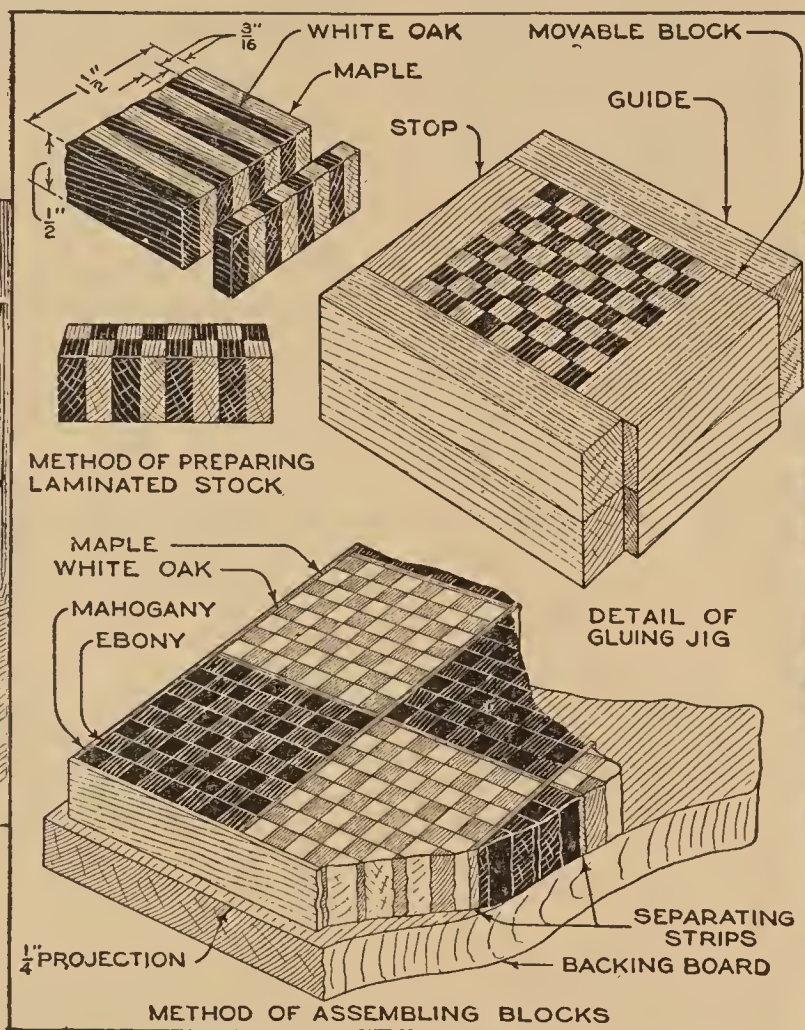
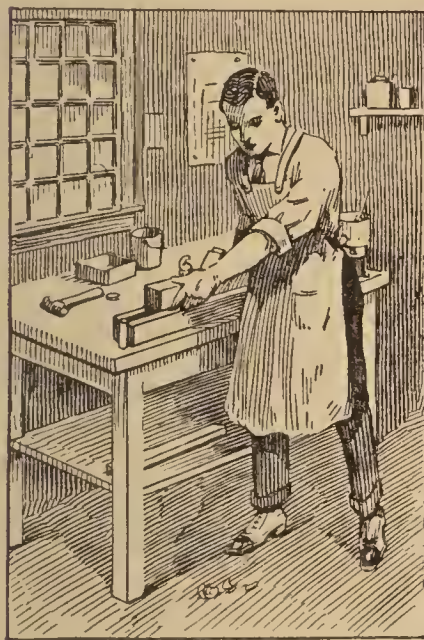
By EDWIN M. LOVE

IN the checkerboard design illustrated, each square is a miniature checkerboard in itself, composed of 64 light and dark squares.

For the dark squares, 16 strips each of ebony and mahogany, $\frac{3}{16}$ by $\frac{1}{2}$ by 17 in., are needed, and as many strips of maple and oak of the same size will be needed for the white squares, a total of 64 strips. Using alternate strips of light and dark-colored wood, eight strips are glued together to make a laminated piece, $1\frac{1}{2}$ in. wide. From this piece, after it has been glued and both faces sanded, $\frac{3}{16}$ -in. sections are

seven strips of red oak, $\frac{1}{16}$ by $\frac{1}{2}$ by $12\frac{1}{2}$ in., and 56 similar strips, $1\frac{1}{2}$ in. long. Paint the face of the board with glue and place in the angle formed by the strips at the edge, which should be at the lower left corner, one of the dark squares, with an ebony square in the corner, and the grain running parallel with the left edge of the board.

Glue one of the short separator strips to the upper edge, and then place a light block in position, with the grain at right angles to that of the dark, and with the light maple square in the lower left corner.



An Inlaid Checkerboard, the Squares of Which Are Miniature Checkerboards Themselves, being Built Up of Light and Dark-Colored Woods

cut transversely, and eight such sections glued together to form a square of the board, using the gluing jig illustrated for the purpose. The sections are cut $\frac{3}{16}$ in. wide in a miter box. The strips are glued together so that light squares will come next to dark ones, the mahogany and ebony being used for the "black" squares, and the oak and maple for the "white" ones.

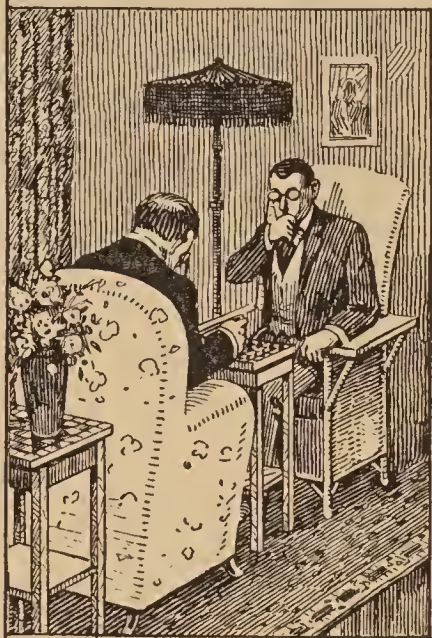
All of the gluing operations should be done in a warm room and the stock should also be warmed. The wooden gluing jig should be made long enough to accommodate about eight squares at a time, each being separated from the other by a strip of paper. By rubbing the edges of the jig with paraffin, the glue will be prevented from sticking, and the blocks can easily be removed.

For a backing board use a $\frac{1}{2}$ -in. pine board, $14\frac{1}{2}$ in. square. Nail and glue two $\frac{1}{16}$ by $\frac{1}{2}$ -in. red-oak strips near two edges, to form a right angle, and also prepare

the row and start building up the next row. When all the blocks are assembled, inclose the two open sides with strips, and clamp them tightly until the glue sets.

When the glue has dried thoroughly, trim the ends of the separator strips flush, and glue $\frac{1}{16}$ -in. strips around the remaining two sides. Cut off the edges of the backing board to leave a $\frac{1}{4}$ -in. projection, and scrape and sand the surface smooth; wax it, or, if a higher gloss is desired, fill with a light-paste filler and give three coats of varnish.

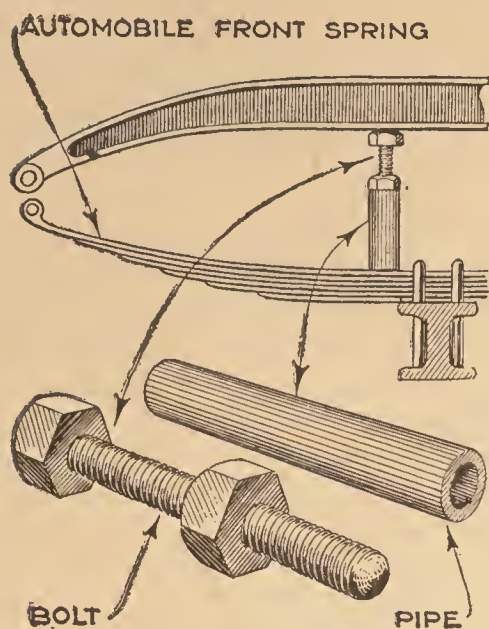
¶ Before using raveled-out wool for knitting, wind it in hanks, and place it in a steamer until thoroughly moistened. Then let it dry and wind into balls. The yarn will be straightened out and the color freshened.



When the row of eight squares has been placed against the pine strip at the left, glue one of the long separator strips to the inner edge of

Safety Spring-Hanger Bolts

One job that will try the patience of the automobile repairman consists of lining

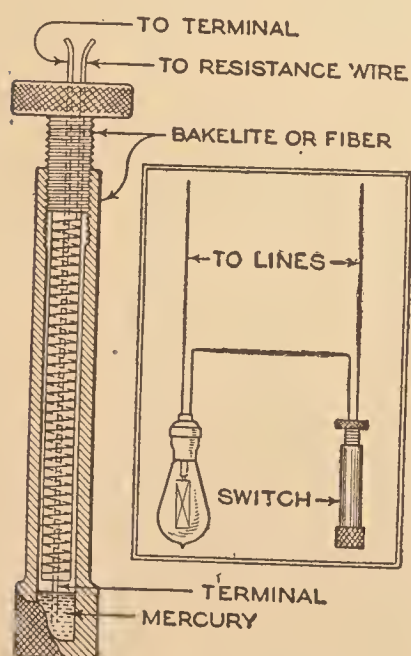


up the eye of a spring with the spring hanger in the chassis. The stiff springs are difficult to handle unless some means is provided for alining the two eyes. A simple jack for flexing the spring and lifting the weight of the car can be im-

proved from a bolt and a short piece of pipe or tubing, as indicated in the drawing. These materials are usually easily obtainable, and with a few of these jacks, much time can be saved in working the eye of the spring into the proper position for the insertion of the shackle bolt.—G. A. Luers, Washington, D. C.

A Simple Dimming Switch

The drawing shows a very sensitive and simple dimming switch for use with an electric incandescent lamp, in locations where a dim light must be kept burning constantly. A hard-fiber, or bakelite, rod is turned down, as shown, to form a



plunger, leaving enough of the original diameter to form a head, which is then knurled. A portion of the length of this rod, at the upper end, is threaded to fit the tapped hole in the mercury container. The latter consists of another piece of rod which is bored and tapped, the diameter of the hole below the thread

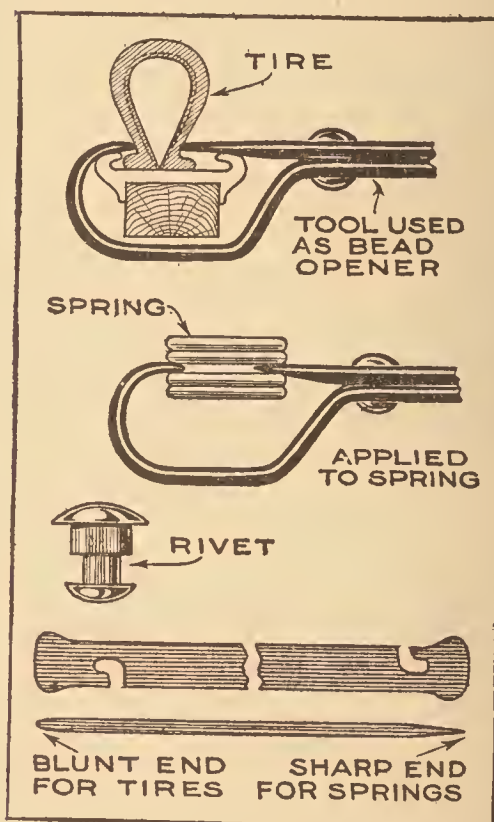
being slightly larger than the plunger. The plunger is drilled, along the vertical axis, with a $\frac{1}{16}$ -in. drill, a copper wire being run through the hole, and projecting through the bottom of the plunger.

Resistance wire is then wound around

the outside of the plunger, being firmly fastened at the bottom and led in at the top through another $\frac{1}{16}$ -in. hole paralleling the center one. At the bottom of the container, a small quantity of mercury is placed; as the container is screwed upward, the mercury rises in the annular space between plunger and container, so that the current flows through less of the resistance wire, thus increasing the current strength until full light is obtained. Screwing the container downward, of course, reverses this process. This type of switch has been successfully used on small motors and baking ovens, in addition to lamps.—W. Burr Bennett, Honesdale, Pennsylvania.

Combined Spring Spreader and Tire Remover

A tool that serves equally well for spreading the leaves of automobile springs



for the application of lubricant, or for removing a tire when the beads have rusted to the rim, is shown in the drawing. The tool can be forged on the anvil, from parts of old wagon tires, in less than an hour.

A shouldered rivet is permanently fastened to the curved part, as illus-

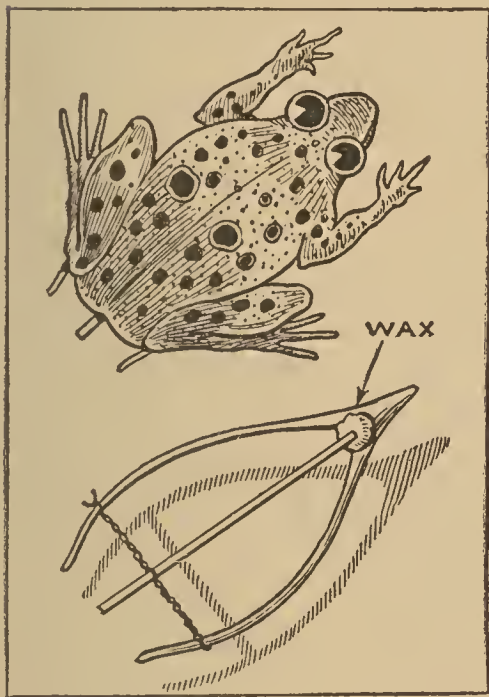
trated, and curved slots that fit around the shoulder of the rivet are provided in each end of the lever handle, but on opposite sides. The span of the tool is somewhat different for the two uses, and for that reason the blade ends are not quite duplicates, the difference being in the distance from the pivot hole to the end of the blade. The hook portion of the tool is simple enough to understand without explanation, while the only detail of the handle that need be further explained is that the end used for tires should be blunt, the opposite end being sharpened for easy insertion between the spring leaves. The blade can be removed from the device and used as an ordinary tire tool for pulling the bead over the rim.

Spring Prevents Breaking of Fishline

"The big one that got away" would, perhaps, have been landed, had the strain on the line been applied more easily when the fish struck the bait. However, as fish are not particularly considerate, the angler must provide a means for preventing his line from breaking, and one that will materially assist in landing his game. This may be done by merely interposing a short length of small-diameter spiral spring of the proper tension between line and hook. The spring will absorb a considerable portion of the strain on the line caused by the vicious lunging of certain varieties of game fish.—O. S. Billings, Ruskin, Fla.

A Jumping-Frog Toy

An entertaining little toy can be made from the wishbone of a fowl after it has been well cleaned and freed from flesh.

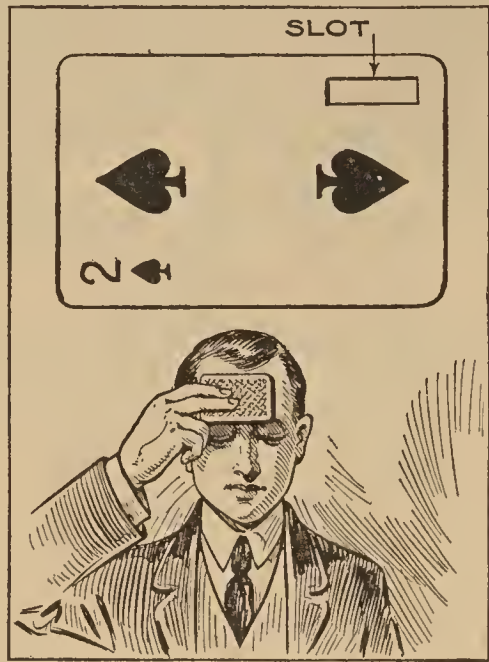


Take a piece of strong, thin string and double it, tying it securely to opposite sides of the wishbone about 1 in. from the ends, as in the drawing. Cut a strip of wood a little shorter than the bone, and make a circular notch about $\frac{1}{2}$ in. from one end.

Push the stick through the doubled string for about half its length, twist the string tightly by means of the stick, then pull the stick through until the notch is reached. From a piece of paper or thin cardboard cut out the outline of a frog, paint it to resemble the animal as nearly as possible, and paste this to one side of the wishbone. The only thing now required is a piece of shoemaker's wax, which is placed on the underside of the bone, just where the free end of the stick will rest. When it is desired to make the frog jump, push the stick down and press the end into the wax. Place the frog on the table, and after a short while the toy will, all of a sudden, make a very lifelike leap as the end of the stick pulls away from the wax.—S. Leonard Bastin, Bourne-mouth, Eng.

The "X-Ray" Pack of Cards

This trick is a "mind-reading" stunt which is worked on a new principle, and is very puzzling. A full pack of cards is shown and half of them are handed out, the other half being kept by the performer. A spectator is asked to select any card from those he holds, and insert it in the pack held by the performer, while the latter's eyes are closed or his head is turned.



Without manipulating the pack in any way, the performer places it against his forehead and instantly names the card chosen by the spectator.

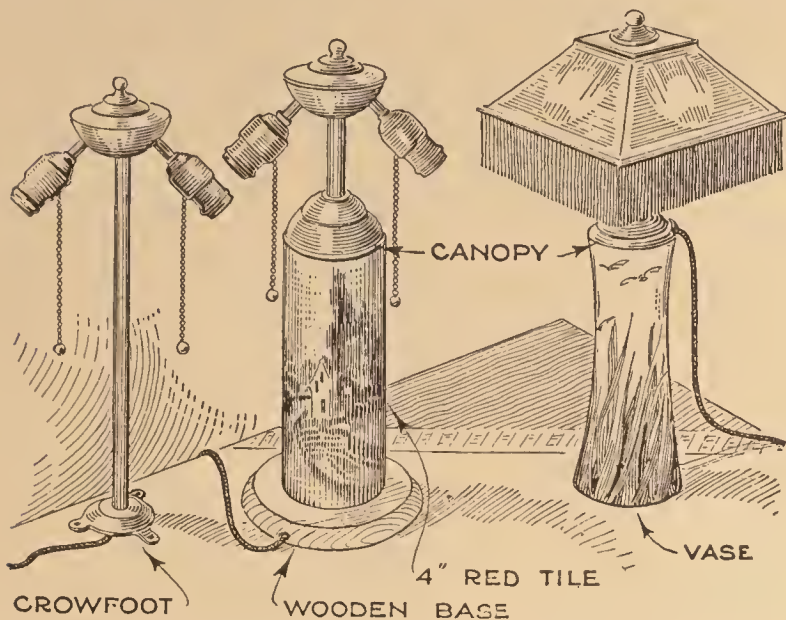
The cards held by the performer are prepared for the trick by cutting a slot $\frac{1}{8}$ in. wide and 1 in. long in one corner of 25 cards, with the sharp point of a penknife, in such a manner that all the slots coincide. In presenting the trick the performer keeps all the prepared cards, and also one card which has no slot, the latter being kept on top of the pack so that the slots cannot be seen by the spectators. The performer's thumb is held over the slots when the bottom of the pack is shown. A spectator is asked to insert a card face down into the cards the performer holds in his hand. When this is done the thumb is lifted from the slot as the cards are raised to the forehead, when the performer can look through the pack and see the index on the card the spectator has selected. After the forehead "stall," the performer announces the card selected. The trick is repeated by "fanning" out the cards and extracting the card named.

Corked Bottle Used as Float

A simple and effective substitute for a wooden float, which becomes waterlogged after continued use, for water tanks and similar purposes, can be made from old bottles. The bottle is stoppered with a tight-fitting cork, which is made leak-proof with sealing wax. The bottle can be fastened to the end of a float arm by means of metal clamps.

Artistic Lamps Made from Vases and Drain Tile

There are few household furnishings that create an atmosphere of hominess



Attractive Table Lamps That can be Made from Such a Humble Article as the Ordinary Brick-Red Farm Drain Tile, or from Vases of Any Size and Form

and furnish cheerfulness to the whole family more completely than lamps which harmonize with their surroundings.

The common brick-red drain tile can be elevated to a position of beauty by using it as a part of a lamp of the type shown in the drawing. The tile itself can be decorated in any desired manner, as by painting some simple scene in oils against an enameled ground. The wooden base should have a diameter large enough to prevent the completed lamp from being easily upset. The electrical fittings, shown at the left, can be obtained from any dealer in such articles. The crow-foot should be screwed to the center of the wooden base in such a manner that the upright pipe will be in the exact center of the tile. When all parts have been assembled the space inside the tile is filled with cement. The vase lamp is practically the same in construction, but because the value of the vase is to be retained, no hole is drilled in its base, which makes it necessary to run the cord in over the edge, and down to the crowfoot. In order to make a lamp of this type stable, the vase is partly filled with dry sand.—Truman R. Hart, Ashtabula, Ohio.

Soil Crusher Made from Mower Wheels

A very useful implement for the farm, for breaking up hard lumps or clods on the surface, is a soil crusher made from old mowing-machine wheels, or wheels from a similar implement. If the maker of such a device does not possess a sufficient number of wheels, a few visits

among his neighbors, or to the nearest junk man, will provide plentiful material.

The construction of such a roller is quite simple and is done by merely mounting the wheels on a shaft of the proper length and diameter, with a thin washer between each pair of wheels. This shaft is mounted on a strong wooden framework of 4 by 4-in. lumber. A tongue is attached to the implement for hitching to the horses or tractor. The wheels revolve freely on their stationary axle and consequently the proper differential effect is obtained so that corners can be turned without skidding. The wheels should be kept well lubricated to prevent undue wear on the shaft.

Hook Pulls Straw from Stack

Looking somewhat like the harpoon of the old-time whalers, the wooden hook shown in the drawing is used for pulling hay or straw

from a stack, without wasting a considerable amount of it. The hook can be made from either wood or metal, so that it can be thrust easily into the stack. The barb is formed about 3 in. from the end; this



catches the straw, and, when the hook is pulled out, a quantity of straw comes along with it. By using this method it is unnecessary to disturb the top that has been arranged to shed the rain. In case a metal hook is used, it can be fastened to a wooden handle, but a straight sapling will answer just as well, especially if there is a conveniently formed crotch near one end that can be utilized in forming the barb.

Flexible Liquid Court-Plaster

A formula for making a flexible liquid court-plaster that can be painted over small bruises, cuts, and other unimportant wounds to keep them free of dirt, is made in the proportion of 10 oz. of flexible collodion, which can be obtained at any drug store, 20 gr. of Canada balsam, and 10 drops of castor oil.



Bicycle Grinding Outfit with Many Original Features

By JOHN ANSON FORD

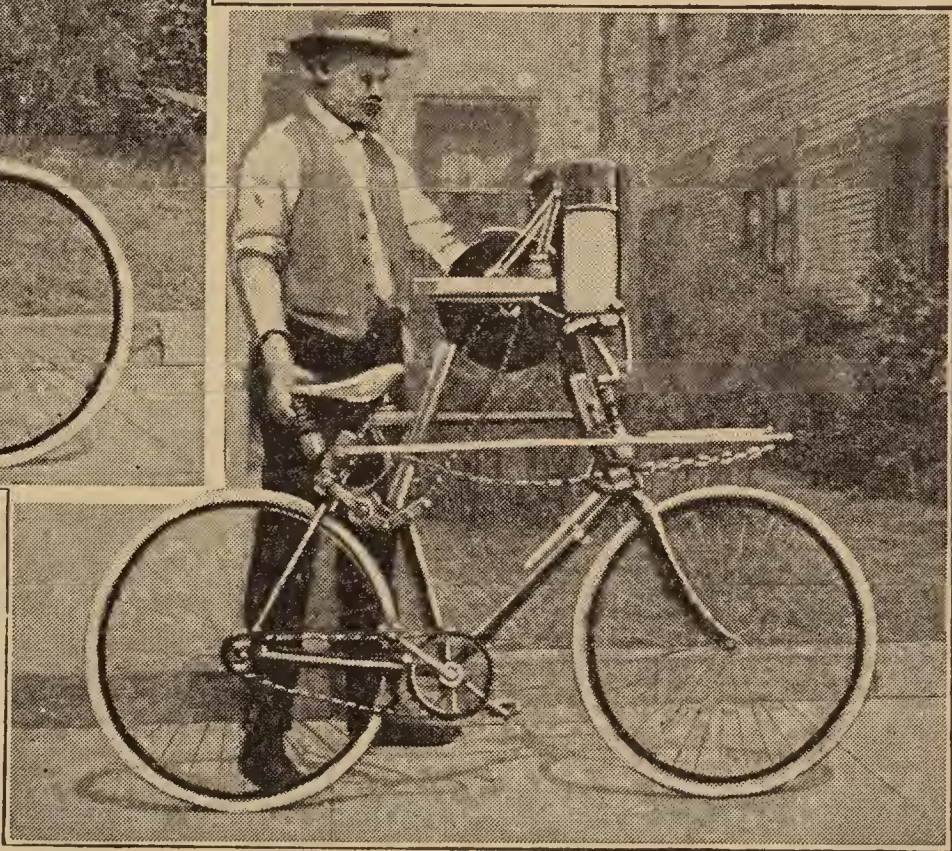
BY constructing a particularly ingenious grinding outfit, which is mounted on a bicycle, a westerner has emancipated himself from indoor shop work, and provided himself with a practical means of earning a livelihood in a congenial manner. The equipment is such as any person used to handling tools can make with little or no difficulty.

tact with the rear wheel, when the rear of the bicycle is raised from the ground on the special stand provided for making the outfit stable. The friction wheel is operated by a spring-held lever which holds it firmly against the rubber tire of the rear wheel, and so provides a very satisfactory means of driving the grinding wheel. The stand, or frame, for elevating the rear of the bicycle from the ground and supporting both the outfit and its operator, consists of two rods, about 5 ft. long, which are hinged to a block fastened just underneath the saddle; these are spread out, and their ends thrust into the ground, when the grinding outfit is to be used.



A Tool and Knife-Grinding Outfit Mounted on a Bicycle, the Rear Wheel of Which is Raised by Long Rods: The Upper Photograph Shows the Rods Extended; the Lower Picture Illustrates How the Rods Fold Out of the Way

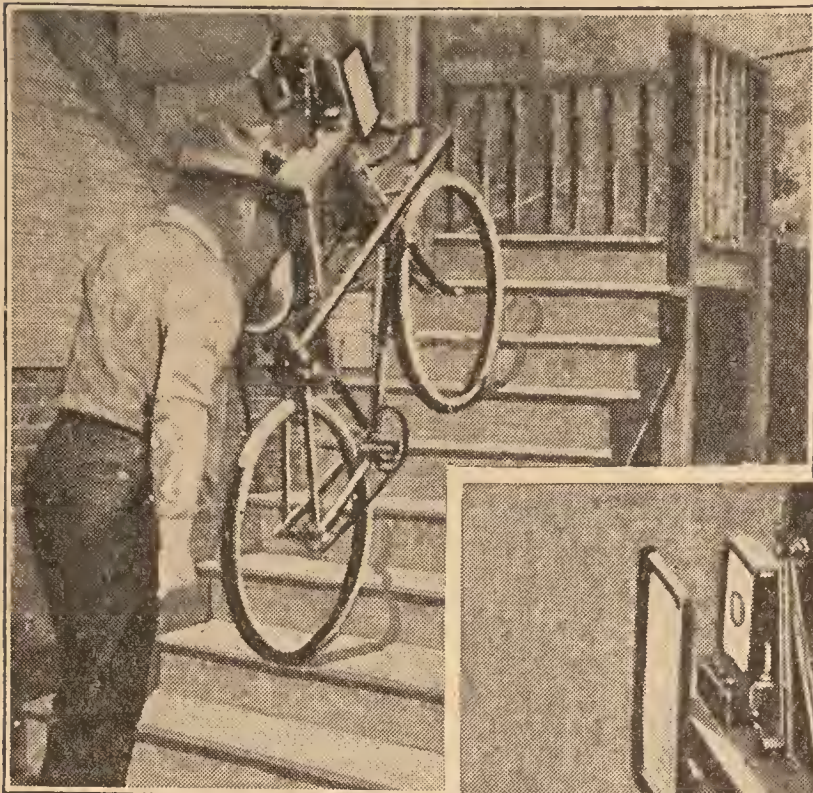
The equipment, as illustrated in the several photographs, is original with the builder, who worked up his own design. It consists of an oak frame that forms a table on which a fine-grained emery wheel, for knife and tool grinding, is mounted. The ordinary arbor of the grinding wheel was removed, and a bicycle hub substituted, to insure even, easy running. A small sprocket on the side of this hub carries a chain, which runs over another sprocket, also mounted on a bicycle hub; this is fitted with a friction wheel, which is brought into con-



To each side of the machine two chains are fastened, one to the rear of the frame, at the hub, and the other at the upper end of the front fork. When the supporting rods have been put into position, the chains are stretched taut to the lower ends and fastened there by hooks, thus forming a rigid support.

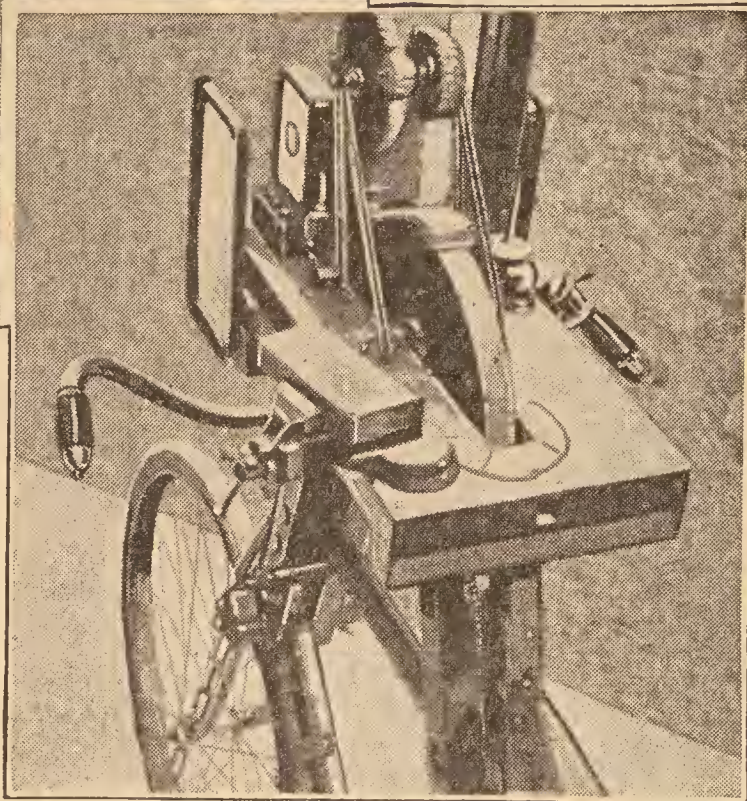
The manner in which this important feature of the device folds up parallel to

the frame, without interfering with the operator when he is traveling, is shown in the second photograph.



A Counterweight and Pulley, Fastened to the Porch, Makes It Easy to Move the Outfit Up and Down Steps. The Lower Picture Shows the Complete Equipment as Mounted on the Wheel

Much ingenuity has been displayed in designing the various accessories, which include a buffer and scratch brush, mounted on a third bicycle hub, upon which, at its center, a friction wheel is mounted. By means of an adjustable frame, which is clearly shown in the lower photograph on this page, these wheels can be brought down to



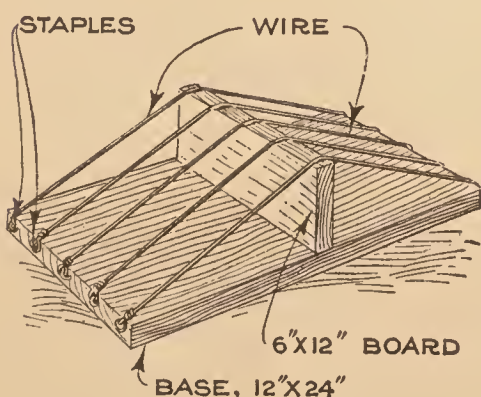
make contact with the grinding wheel, so that polishing and cleaning can be done without the operator changing his position. A level is mounted on the table to enable the owner to set up his machine accurately, while a small vise, pivoted to one corner of the stand, is used to hold a fine-grained oilstone. When not in use, the vise is swung around out of the way. Convenient holders are provided on the table for two socket wrenches and an oil-can, other tools being carried in a case attached just underneath the water can, which is provided with a petcock to drip water onto the grinding wheel.

The whole outfit cost its maker about \$45, and two months of his spare time to complete. The total weight of the wheel and its attachment is about 80 lb., and while this is a rather heavy wheel, it has not been found hard to manage, except when carrying the outfit up and down stairs to the room in which it is kept. To overcome this difficulty a counterweight and pulley

have been rigged up in the corner of the porch. When the rope fastened to the counterweight is hooked at the front of the bicycle, it is a very easy matter to move the outfit up or down the steps.

A Wire Boot Scraper

A most efficient boot scraper can be made from two boards and a few feet of strong wire. A T-shaped support is made



by nailing the two boards at right angles to each other. The upper edge of the perpendicular board is notched to keep the several wires from shifting

their positions. One end of each wire is fastened to one end of the horizontal board with staples, the wires being then

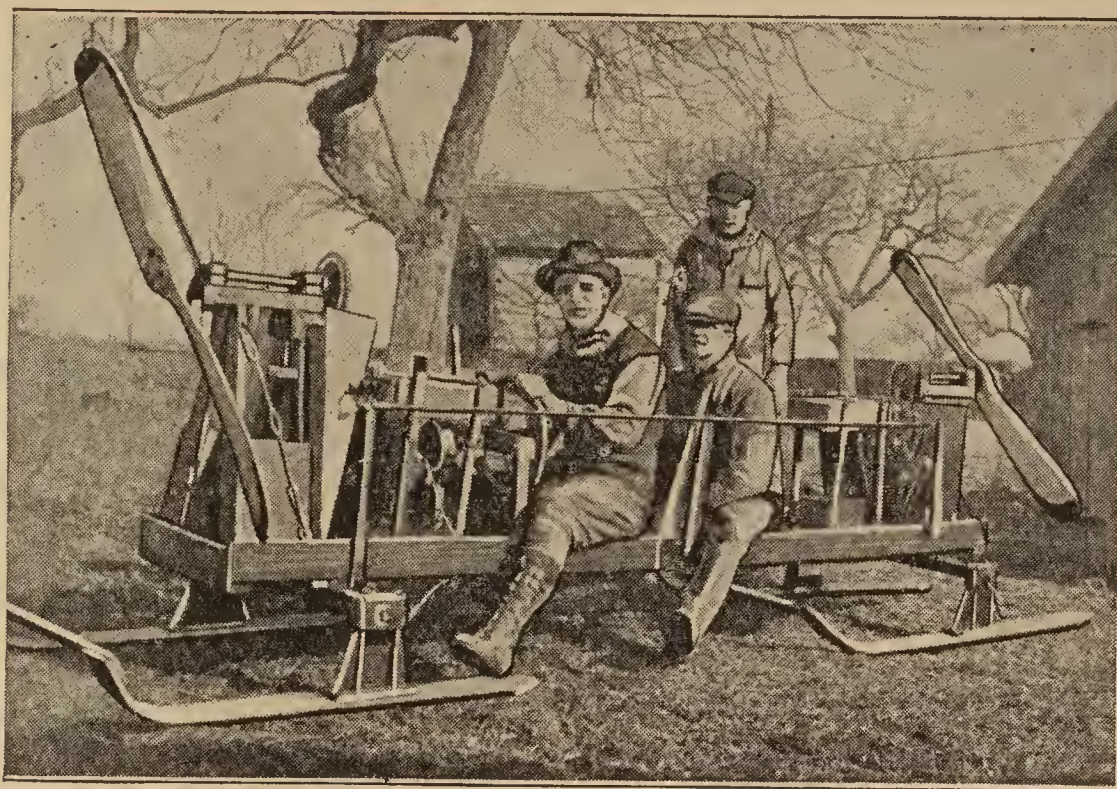
drawn up tightly across the vertical support and made fast with staples to the opposite end of the base. When the foot is drawn across the taut wires, the mud is scraped off and falls onto the base.

Cleaning Furnaces

In cleaning out furnaces of the pipeless or hot-air types, an automobile-speedometer shaft, about 6 ft. long, can be used to reach parts of the furnace, such as the radiator, that are inaccessible to the usual cleaning tools. A brush is attached to one end and a round can fastened a short distance behind it. In use, the arrangement, brush first, is pushed around the smoke flues, the brush dislodging the soot and dust and the can collecting and removing it.

A Powerful Aero Sled

Something a little different from the usual type of air-propelled sled—one that uses two propellers instead of one—is shown in the photograph. This particular vehicle uses both “pusher” and tractor propellers and is designed for use on hard-packed snow or ice. Two motors, one for each propeller, of the ordinary twin-cylinder motorcycle type are used, the motors being bolted to the frame of the sled. Brackets support the countershaft bearings and give the proper clearance to the blades. One end of each countershaft is bolted to the propeller, and sprocket wheels are keyed to the opposite ends, as the propellers are both driven from the motors by sprockets and chains. The speed of both motors can be controlled by a single lever within easy reach of the driver, and separate fuel tanks are provided for each engine. The frame of this aero sled is made from two spruce sticks, about 12 ft. long, with ash crosspieces. The runners are made like skis, and have steel shoes underneath to prevent skidding.



A Powerful Aero Sled That Uses Fore and Aft Propellers, Driven by Separate Engines of the Twin-Cylinder Motorcycle Type

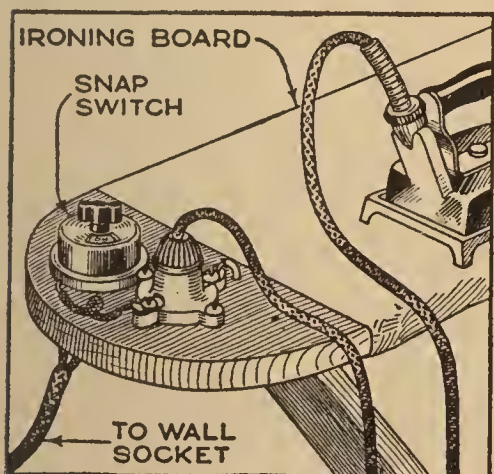
The front propeller is 5½ ft. in diameter, and the rear one is 4 ft. 10 in. The forward propeller is geared to run at about 1,100 r.p.m., while the one aft turns at

from 1,300 to 1,400 r.p.m., so that even though it is in the air stream of the forward propeller it will take a good grip on the air.

This sled is very strongly built and has great speed, with a passenger capacity of three. Wire guys, fitted with turnbuckles, are used throughout the entire structure to keep the frame and mechanism rigid.—C. S. Greene, New York, N. Y.

Indicating Switch for Electric Irons

In order to prevent wear on the electric-iron plugs, and at the same time have some convenient means of controlling the



current as well as knowing when the “juice” is turned on or off, an indicating snap switch and keyless porcelain socket may be permanently fastened to the

ironing board. Connection is made to the source of current by means of a suitable length of cord with a plug, which is attached to the snap switch on the ironing board. This arrangement makes it unnecessary to pull the plug from the

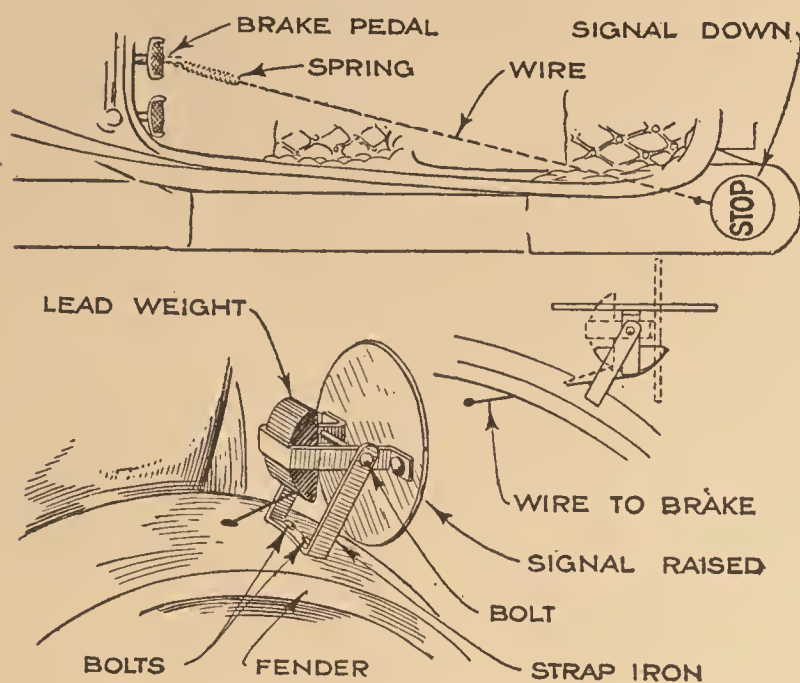
iron, and besides, the cord hangs down from the board instead of being in the way, as it is when connected to an overhead lamp.—K. L. Martin, Cleveland, Ohio.

Cotter Pin Aids in Tube Repairs

When a tire is punctured and the inner tube deflated, it is necessary to pump up the tube to locate the hole. When the hole is located, the air is let out through the valve so that the tube can be cemented and patched. A simpler way than removing the inside of the valve or depressing it, is to insert a cotter pin into the puncture. The ends of the cotter pin are spread apart to distend the sides of the hole, and it is then an easy matter to force the air through the enlarged opening. Also, the application of a little patching cement to the inside edges of the hole makes a better job, and with the cotter pin holding the hole open, this is easy to do.

A Simple Rear Signal

The "stop" signal illustrated is designed to be attached to the left rear fender of the car. It is connected to the service-



An Automatically Operated Warning to the Car Behind That the Driver Intends to Stop or Slow Down is Operated by Pressure on the Service-Brake Pedal. Normally the Warning "Stop" is Not Displayed

brake pedal so that the slightest forward movement of the pedal will swing the circular target to a perpendicular position and display its warning. The sheet-metal disk is provided with a weight, which is attached to it by a bracket, as indicated in the drawing. Another bracket is bolted to the fender to support the weighted disk. Normally, the weight will keep the disk in a horizontal position, and operation of the brake pedal is required to make the device show its warning; this is accomplished by means of a wire, running from the weight to the brake pedal. To compensate for wear of the brake bands, which allows the pedal to move forward a greater distance, a coil spring is attached, as indicated. A signal of this character is of special value to truck drivers, where the rear view is obstructed by the body.

Electric Iron Used as Vulcanizer

Tube vulcanizing is expensive, and often a new tube is discarded because of a single blowout that is too large to be covered with a cold patch. To be sure, there are various types of vulcanizers that are to be had for a small sum, but as a rule they are mussy and inefficient, often ruining the tube beyond repair, and with small gasoline vulcanizers, there is the added danger of fire.

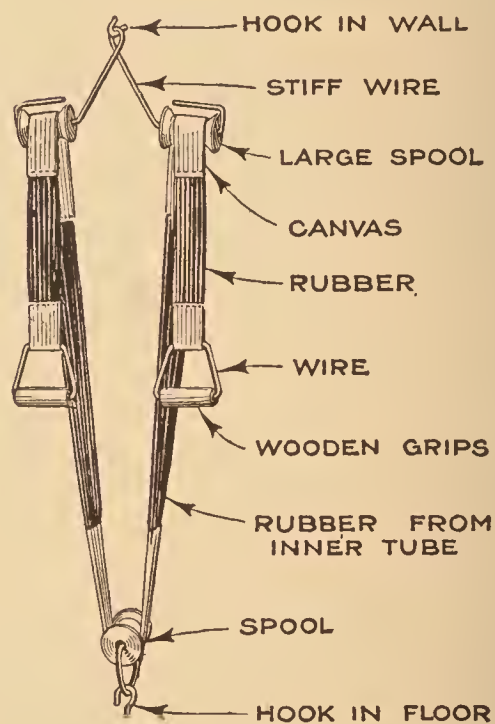
A safe and reliable vulcanizer that covers a large area can be made by removing the handle from an electric flatiron and

using it as the heating unit. Inner tubes can then be vulcanized anywhere that current is available. A repair can be made very close to the valve without removing it, and any size of hole can be mended by making one or more settings of the iron. It is advisable to try out the vulcanizer on an old tube first. In making a repair, always powder the patch with soapstone, or French talc, and lay a piece of paper over it before applying the vulcanizer. This will prevent the hot iron from sticking to the tube.

A short piece of iron, with holes bored in one end, screwed on in place of the handle, will make the removal of the hot iron an easy matter. In use, the electric-iron vulcanizer is clamped to the tube with one or more ordinary C-clamps.—Glen F. Stilwell, Collinsville, Ill.

A Homemade Exercising Machine

Old inner tubes, and some stiff wire or iron rod, together with three large spools, are the materials used for making a home exerciser at insignificant expense.



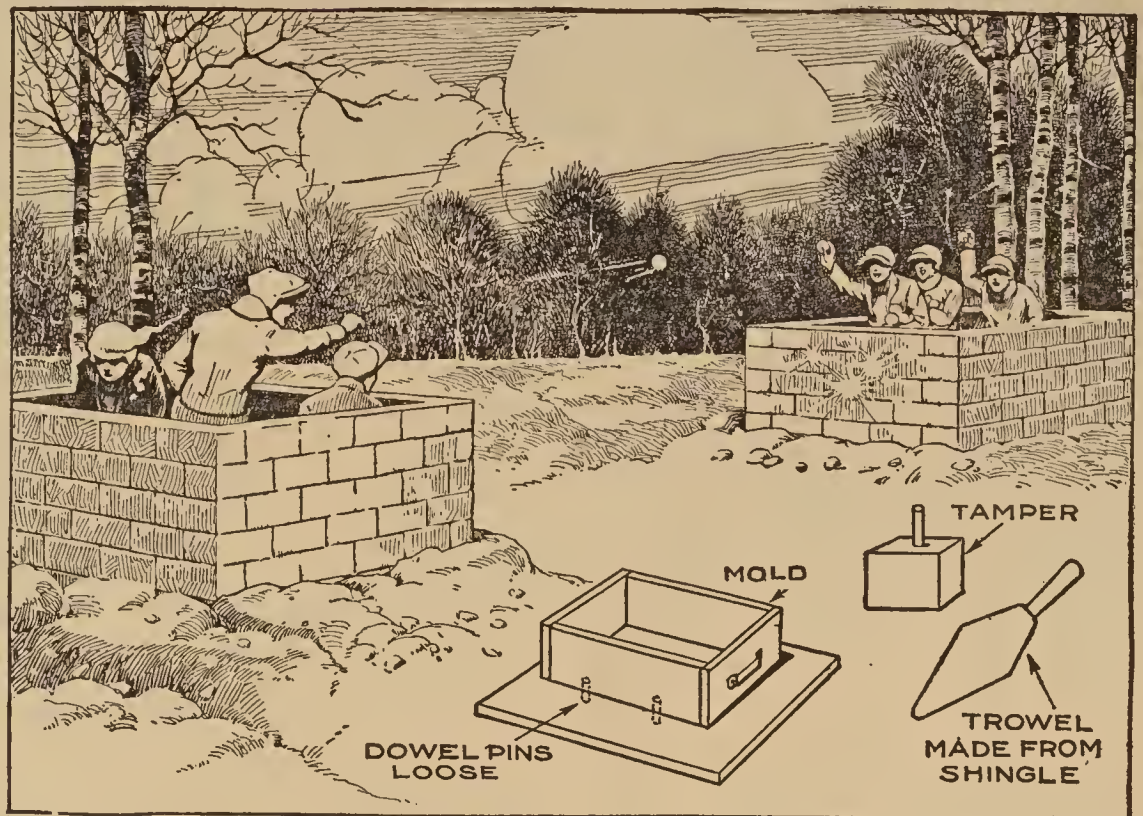
The rubber is cut into strips, 2 in. wide and of the length desired, two or more of the strips being cemented to each other, as may be desirable. Where the bands pass over the spools, canvas is used instead of rubber, on account of the wear. The pieces of canvas are sewed along the edges and turned inside out to make a flat tube the same width as the rubber bands. The ends of the rubber strips are covered with rubber cement on both sides, inserted into the canvas, and weighted down until thoroughly dry. The arrangement of strips, spools, and hooks is clearly shown in the drawing.

Any discoloring matter in water will stain a water gauge glass and make it difficult to see the water level. When it becomes necessary to clean the glass use hydrochloric or muriatic acid.

Making Snow Building Blocks

Forts, Eskimo igloos, and other buildings can be made quite elaborate architectural accomplishments if constructed of snow building blocks. The snow is compressed in a simple rectangular wooden mold, which produces a block about the same size as the standard concrete block, or 8 by 8 by 16 in., although any other size or shape may be produced by altering the mold. The mold is placed on a flat surface, filled with snow that is tamped down hard, and the snow struck off level with the mold top. After the snow has been sufficiently compacted, the mold is removed, and the block is set aside until a sufficient number have been made to complete a fort or other structure. In building, the blocks are held to-

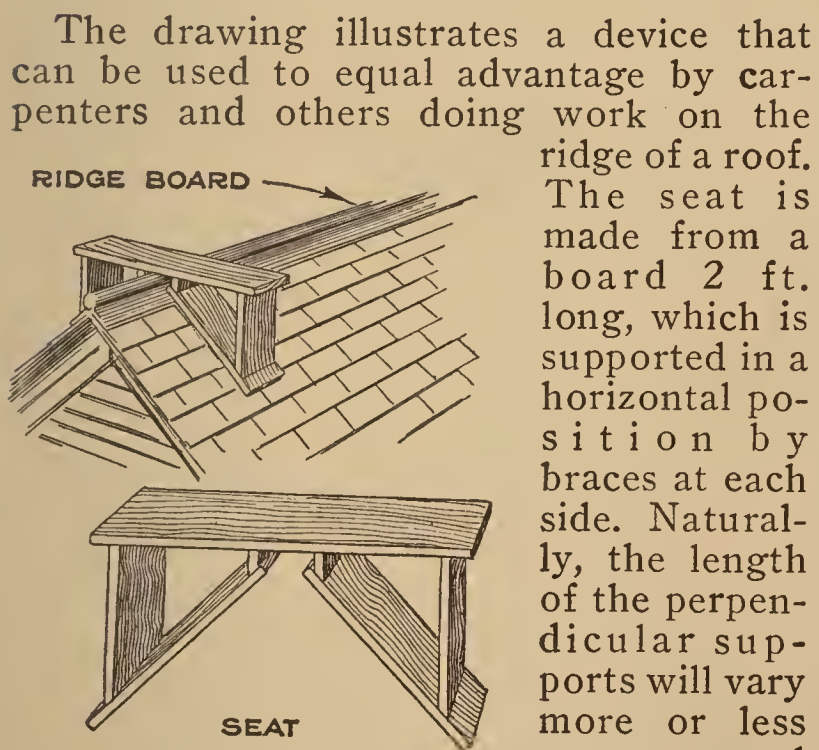
gether by a "mortar" of wet snow or slush, which, when frozen, unites the building into one solid mass. The trowel used for spreading the mortar can be



Forts Erected with Building Blocks Made of Snow: The Blocks are Molded in a Wooden Form and Then Laid in a Mortar of Wet Snow, Which, When Frozen, Unites the Building into One Solid Mass

made from a shingle or piece of board.—
John L. Dougheny, Toledo, Ohio.

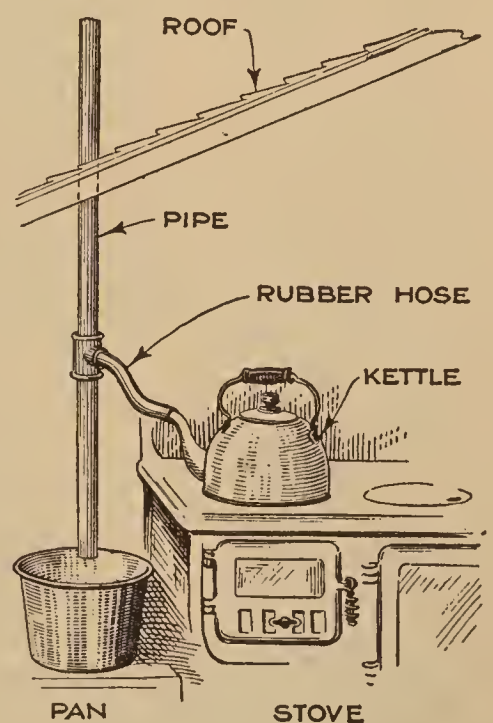
Comfortable Ridgepole Seat



to the pitch of the roof. A seat of this type can be moved forward or backward while the worker is sitting on it, and the fatigue caused by assuming uncomfortable positions is thus obviated. Such a seat is also a safety device for the worker, that will materially reduce the possibility of accident either to himself, or to those below from falling tools.—Augustus C. Hausman, New Haven, Conn.

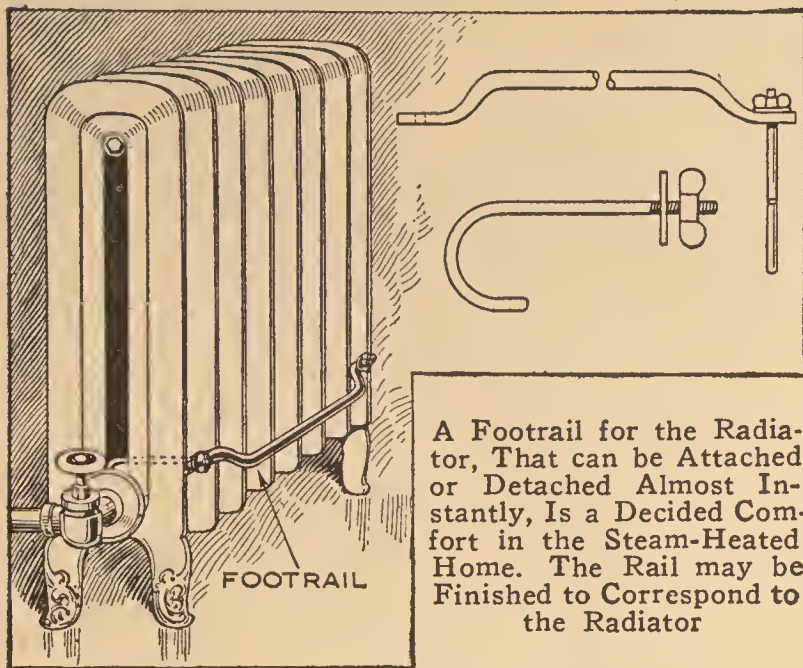
Making Alkaline Water Drinkable

Settlers in parts where the water is alkaline find it difficult to get water that is fit to drink, as it must be distilled or otherwise purified. The illustration shows an easily made condenser that is often used for this purpose, consisting of nothing more complicated than a length of iron pipe provided with a tee in the center, and passing through the roof of the house. The spout of a teakettle is connected to the tee by a short length of hose. When the water in the kettle boils the steam will issue into the iron pipe where it will condense into drops on the inside, the distilled water dripping into a pan.



A Footrail for the Radiator

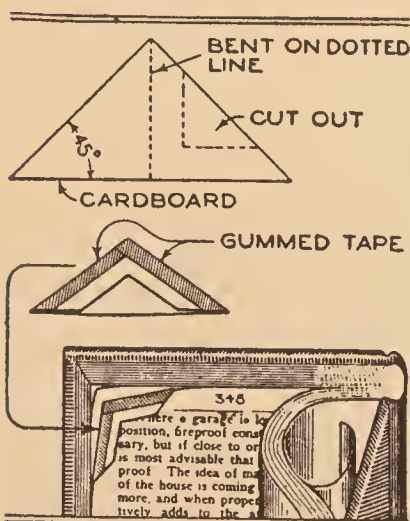
A quickly detachable footrail that can be used on any type of radiator, can be made from a piece of $\frac{1}{2}$ -in. pipe or iron



rod, although the former will probably be found to be stiffer. A piece of pipe of suitable length is bent to the form shown, and the ends are flattened and drilled to take the threaded ends of hooks made of iron rod. These hooks, or clamps, are hooked over the inner part of the radiator between the sections. The threaded ends are inserted in the holes provided in the ends of the rail, which is held rigid by the application of washers and wingnuts.—B. Francis Dashiell, Dunkirk, Md.

Practical Bookmarkers

A bookmarker that is free from the many objections of most types and that slips over a corner of the page is very simply made. Cut a square of rather thin



cardboard, about 2 in. on a side; cut along one diagonal, and place the resulting two triangles together. Now cut two 2-in. pieces of gummed tape and use them to fasten the short edges of the paper triangles together. Finally, cut a small notch in the middle of the long edge of one of the triangles and fit the completed bookmarker over the corner of a stiff card, to clear out any paste or gum that might remain between the two triangles.

To use this bookmark attach it over the corner of the left-hand page of the book on the upper side of the leaf. Do not try to catch more than one leaf in the bookmark, for it will then be sure to come loose when the book is opened. It is a good idea to see that the notched side of the marker always indicates the side where the "place" in the book is.—Curtis Ralston, Springfield, Ohio.

Transferring Printed Pictures

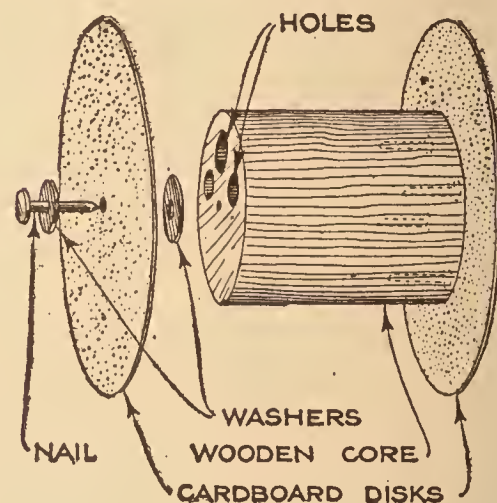
This method may be used for transferring the pictures printed in papers and magazines to paper and fabric for various purposes.

Dissolve a bar of common soap in 1 gal. of hot water and add $\frac{1}{2}$ pt. of turpentine. Allow the mixture to stand overnight, stir well, and bottle, after which it is ready for use.

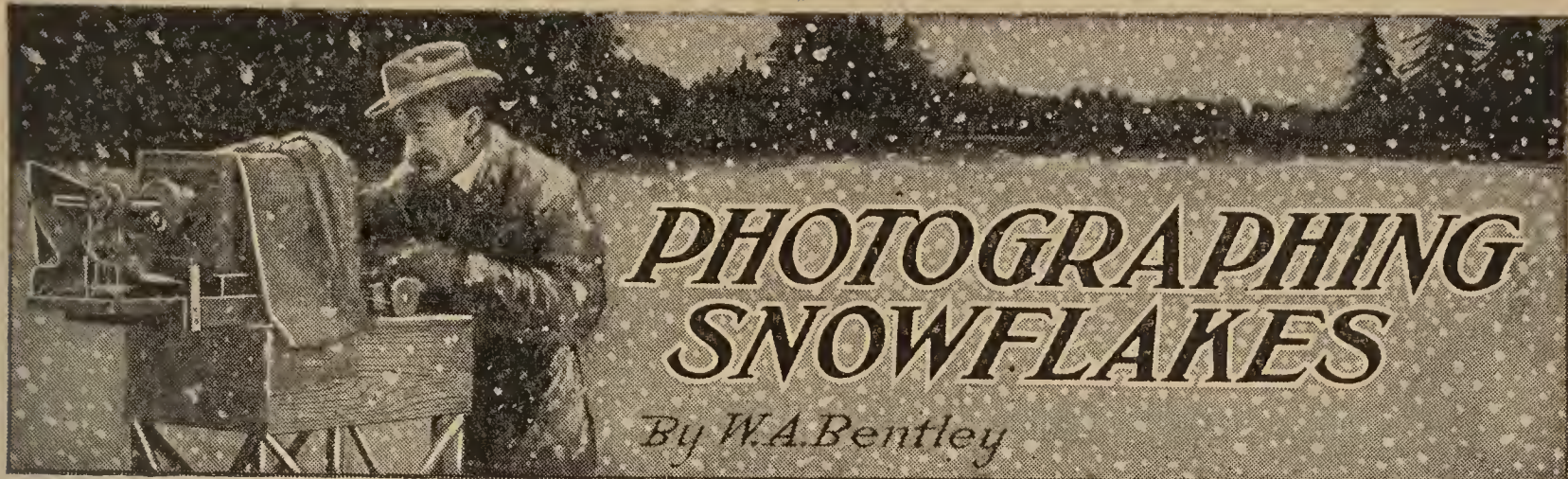
The solution is applied to the face of the picture it is desired to transfer, with a brush or tuft of cotton. A piece of clean cloth or paper is laid over the picture and firmly rubbed with the bowl of a teaspoon, or a similar smooth article.

The Eccentric Spool

A very simple toy will interest the young folks because of its eccentric



conduct and movements when rolled, and because of the unusual principle involved. All that is required is two heavy cardboard disks, and a section of curtain pole about $1\frac{3}{8}$ in. in diameter. One disk is permanently tacked to the end of the wooden core, while the other is attached so as to revolve freely. Three holes, one $\frac{1}{2}$ in. in diameter and two $\frac{1}{4}$ in. in diameter, are drilled all the way through the wood parallel to the center. A washer is provided on each side of the revolving disk to prevent it from binding; this and the holes drilled through the crosspiece are responsible for the unexpected spins and turns that the spool automatically performs when rolled. A very slight push makes it do this; a hard one will send it rolling in a straight line.



EVERY snowflake has an infinity of beauty which is enhanced by the knowledge that the investigator will, in all probability, never find another exactly like it. Consequently, photographing these transient forms of Nature gives to the worker something of the spirit of a discoverer. Besides combining her greatest skill and artistry in the production of snowflakes, Nature generously fashions the most beautiful specimens on a very thin plane so that they are specially adapted for photomicrographical study.

The photographing of snowflakes, although quite delicate work, can hardly be called difficult, although some hardships attend it, because the work must all be done in a temperature below freezing, and under conditions of much physical exposure. The temperature at which photography is possible depends somewhat upon the thickness of the crystals; this varies greatly from time to time, and depends upon whether the temperature is rising from an intense degree of cold or falling from a point above freezing. If rising after a cold snap, photographing can often be continued until actual thawing commences.

Of course, location is everything in this work, and no one except those living in arctic climates or in regions having long and severe winters, can accomplish very much. Generally speaking, the western quadrants of widespread storms or blizzards furnish the most beautiful and perfect forms. At such times the wind is usually westerly or northerly, with the

barometer standing at 29.6 to 29.9 in. and slowly rising. The percentage of perfect crystals is likely to be larger when the snowfall is not too thick and heavy, with the crystals medium to small in size rather than large. The character of the snowfall often undergoes quite abrupt changes as a storm progresses.

The apparatus required for snowflake photography consists of a compound microscope, fitted with a joint that permits the instrument to be turned down horizontally, at right angles to its base,

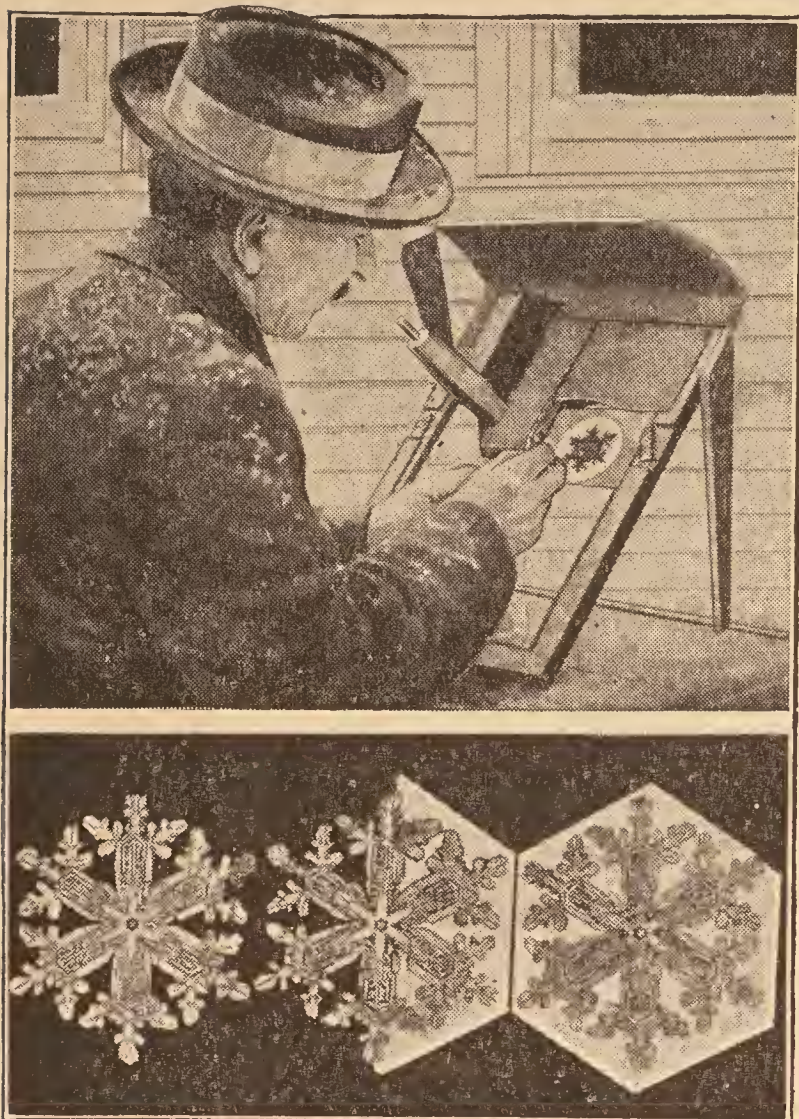
so that it can be coupled to a camera bellows by means of a light-tight connection. The microscope objectives are used alone, without the eyepiece. It is best to have several different objectives; $\frac{1}{2}$, $\frac{3}{4}$, and 3-in. combinations, which give magnifications of from 8 to 60 diameters (64 to 3,600 times), will serve well.

Ordinary daylight, coming through a window, is used for illuminating the crystal after it has been placed on a microscope slide, a tiny beam of light entering through the small aperture in the substage of the instrument. The apparatus is placed indoors, near by and facing a window. The room, the apparatus, and its accessories should always be away from any source of artificial heat, and at a temperature approximately that of the outside air. The necessary accessories are an observation microscope, a pair of thick mittens, microscope slides, a sharp-pointed wooden splint, a feather, and a turkey wing or similar duster; also, an extra focusing back for the camera, con-



A Variety of Strange Forms of Snow Crystals: The Specimens near the Center Are of the Most Interest on Account of Their Rarity

taining clear glass instead of the usual ground glass, with a magnifying lens attached; this is used for final focusing. A blackboard, about 1 ft. square, with stiff wire or metal handles at the ends, so that the hands will not touch and warm it, is used to collect the specimens. As it is necessary to cover the end of the microscope objective with a strip of black card, that takes the place of the usual



Blocking Out the Snow-Crystal Images on the Photographic Negative: Left, Original Negative; Center, Negative Partly Blocked Out; Right, Completely Blocked-Out Negative

camera shutter which controls the duration of exposure, it is necessary to fit two vertical rods at each side of the microscope tube to hold the card.

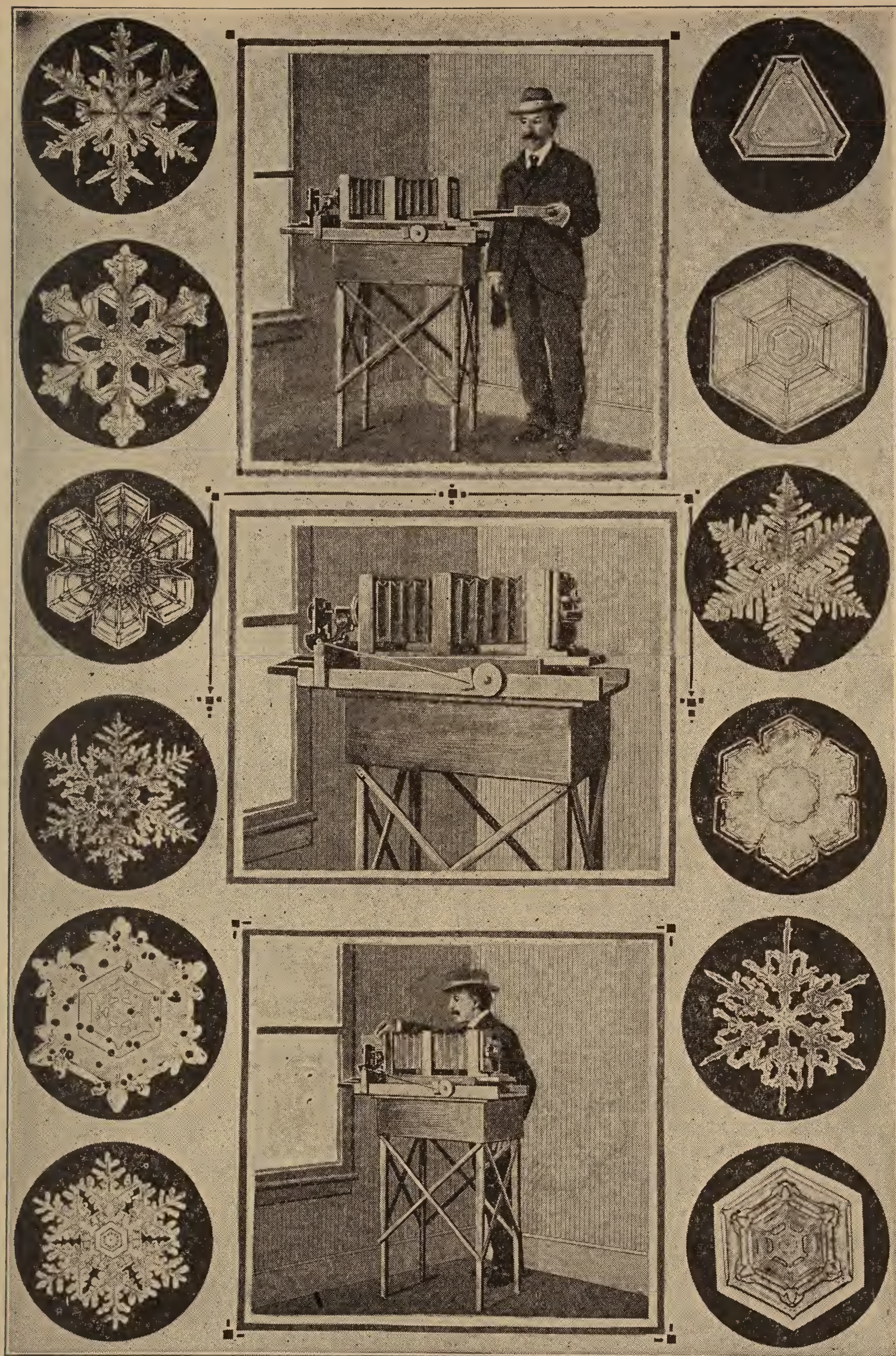
The snowflakes are caught on the blackboard as they fall, and examined by the naked eye or with the assistance of a hand magnifying glass. The feather duster is used to brush the board clean every few seconds, until two or more promising specimens alight upon it, when it is immediately removed indoors. From this point onward the photographer must work fast. The promising specimens are placed for a moment's observation under the observation microscope. The removal of the snowflake from the board to the microscope slide is accomplished with the sharp-pointed splint, which is pressed gently against the face of the crystal until

the latter adheres to it, so that it can be picked up and placed on the glass slide. Usually several crystals are placed together on a single slide, a momentary glance being given to each, and care taken while doing this not to breathe on the crystals. The utmost haste must be used, for a snow crystal is often exceedingly tiny, and frequently not thicker than heavy paper. Furthermore, once these bits of pure beauty are isolated, evaporation (not melting) soon wears them away, so that, even in zero weather, they last but a very few minutes. When a desirable specimen is obtained, it is pressed flat against the glass with the edge of the feather and the slide inserted in the stage of the microscope on the camera stand, centered, roughly focused with the camera ground glass, then sharply focused with the clear-glass screen and magnifier, focusing on some tiny air tube near the center of the crystal. The plate holder is then inserted into the camera, the objective covered with the black card and the slide removed from the plate holder. The objective is then uncovered, and when the exposure, which may vary from 8 seconds to 100 or more, is deemed sufficient, the operation is reversed. Naturally enough, no rule for the length of exposure can be given, except that the greater the magnification, the longer the exposure should be.

The frail, feathery flakes are the most difficult to photograph, and it is always best to place five or six other crystals around the specimen, as this greatly retards the evaporation of the central one.

When working from the rear of the camera, and the bellows extension is such as to make it impossible to reach the focusing screw on the microscope, an arrangement similar to that shown in the page illustration can be used. This consists of a cord that runs over a wheel on each side of the camera and around the focusing screw. No lens is required in the camera, the microscope furnishing the optical equipment for projecting the images onto the sensitized plates.

Having recorded the fleeting substance of the snowflakes on the photographic negative and brought out the image by development, the photographer discovers that the body of the snow crystal is so transparent, that it does not contrast enough with its background to make a print in which the form will stand out in relief. There is no purely photographic method for producing the white images against a dark background, and yet it is necessary to do so if the images are to be



The Apparatus Used for Photographing Snowflakes and Some of the Specimens Selected. Above: The Author Holding the Tray on Which the Snowflakes are Collected. Center: A Cord That Passes over the Microscope Focusing Screw and Wheels at Each Side of the Camera Makes Sharp Focusing Possible. Below: Inserting the Transparent-Glass Microscope Slide, on the Surface of Which Is One or More Snowflakes, into the Microscope Stage, Preparatory to Photographing

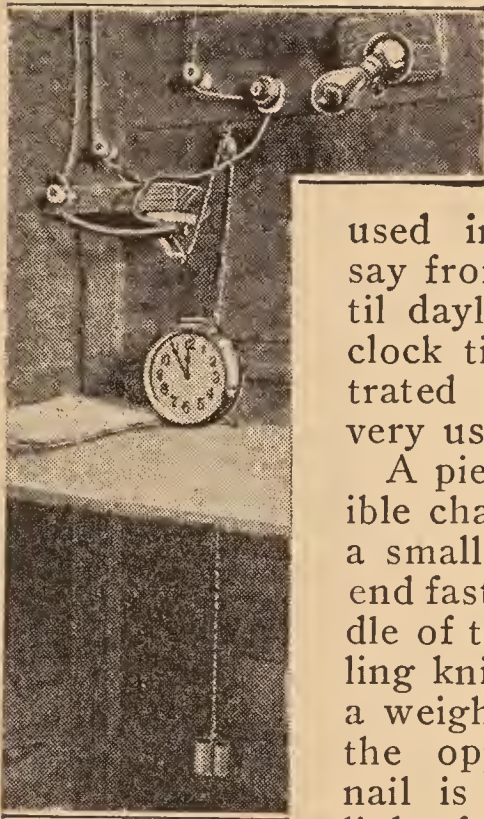
appreciated by most people, whose ideal of snow is that of immaculate whiteness. The only effective method of accomplishing this result is what is known among photographers as "blocking out."

The negative is supported on an ordinary retoucher's desk, which may be merely a piece of glass, arranged to hold the negative so that the image is illuminated by transmitted light. Then, with an etching knife or other fine, sharp-pointed tool, the operator proceeds to scrape away the emulsion around the outline of the crystal to leave it standing

alone against a background of clear glass. This requires considerable patience, and often considerable time as well. In order to avoid irreparably spoiling the original negative, it is best not to alter it in any way, but to make a copy negative on which the actual blocking out is done. After the negative has been thus prepared, prints or lantern slides are made in the usual manner. Blocking out the negatives is done indoors, instead of outdoors as shown by the photograph, which was thus taken to get sufficient light to allow the exposure to be made.

Alarm Clock Turns on Electric Lights

The use of artificial light in poultry houses has become quite popular, as, by increasing the number of hours of light,



the hens have more time for feeding, and lay more eggs. Where electric lights are used in the morning, say from 4:00 a. m. until daylight, the alarm-clock time switch illustrated will be found very useful.

A piece of light, flexible chain, passing over a small pulley, has one end fastened to the handle of the light-controlling knife switch, while a weight is attached to the opposite end. A nail is run through a link of the chain, about level with the alarm-wind key of the clock. One end of this nail is supported on a small block immediately behind the clock and the other rests on the alarm key of the clock, after it has been wound. This arrangement holds the chain and weight, and provides for enough slack chain to leave the switch open. When the alarm goes off at the time set, the alarm key turns and allows the nail to slide off; the weight drops down and closes the switch.

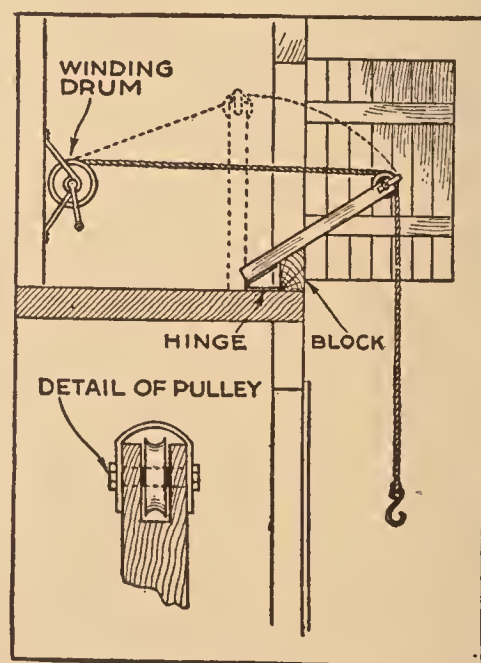
Cleaning Plowshares

To keep plowshares and moldboards, as well as cultivator shovels, from rusting during the time they are laid up, it is best to give them a liberal coating of some thick grease. If the grease hardens on

the surface so that its removal is difficult when the implement is to be used, a small amount of gasoline or kerosene may be poured over the share, and ignited just before the plow is to be used. The heat, together with the solvent action of the gasoline, will soften the grease, and if the plow is started in the ground while the grease is still warm, the coating will peel off easily and completely. A handful of dry hay or grass ignited under the plowshare will answer in the absence of gasoline. Either of these methods is better than scraping the grease off.

A Simple Farm Hoist

A simple hoist that will find many uses about the farm, for raising bags of grain and other bulky weights to the upper floor of a barn or other building, is shown in the drawing.



A wooden beam, of suitable thickness and length, is hinged to the floor at a convenient point inside the door or other opening. The upper end of the beam is provided with a single-sheave pulley, over which the rope passes to the winding drum; this can be easily improvised. A wooden block can be made and inserted underneath the projecting beam so that the arm is held in an inclined position, as shown. The packages are raised clear of the building and, when they reach the pulley, swing inward as the arm rises to a vertical position.

Increasing Tone of Phonograph

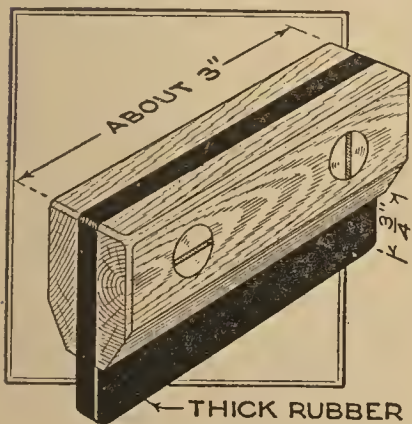
"Extra-loud" phonograph needles are furnished that have a comparatively blunt point so that none of the amplitude of the vibrations is lost as in the long and tapering "soft-tone" needles. When it is desired to obtain a still greater volume of sound, these extra-loud needles can be shortened by breaking off about one-third of the needle at the blunt end. This is done by holding the needle in two pairs of pliers and bending it. The needles are hardened and will break easily. The shortened needle is secured in the reproducer and permitted to protrude just enough to allow the other parts of the reproducer to clear the record. The greatest possible volume of sound is then obtained from the records for playing dance music or piano records.—Chas. I Reid, Millersburg, Pa.

Cheap Soot Removers

To clean out stovepipes and furnace flues of an accumulation of soot without trouble or muss, is entirely possible by the use of common materials. Metallic zinc is one of these soot-removing agents, and it can be used in any form, such as old tops from fruit jars, old washboard coverings, dry-cell cases, and the like. In the case of the last-named, a particularly pleasing effect is obtained when an old dry cell is dropped into the flames of an open fire, which produces a delightful play of colored light. A handful or two of salt thrown into the furnace is also good for removing accumulations of soot.—Cora Hamilton, Binghamton, N. Y.

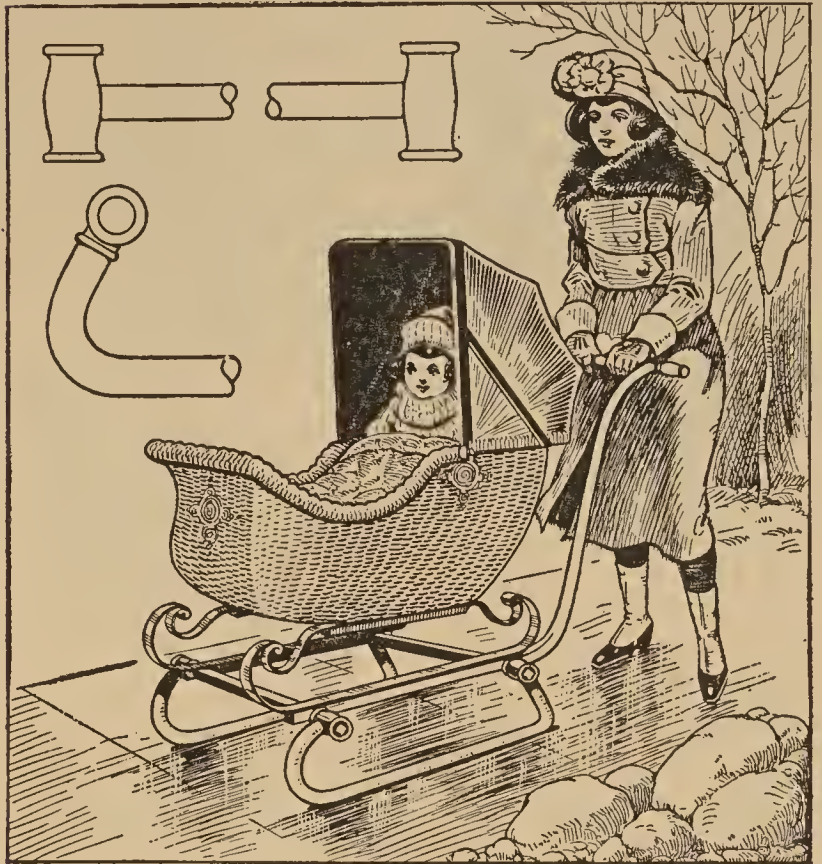
Scraper for Dinner Plates

A little convenience for the kitchen that will save a considerable amount of labor is the easily made scraper shown in the drawing. A sheet of thick rubber is clamped between two hardwood blocks of the proper dimensions with ordinary screws. One or two passes of such a scraper over a dish cleans off practically all grease and other remains much more quickly and effectively than is possible by the use of a knife or similar implement.



Sled Runners for the Baby Carriage

Four pipe tees, and suitable lengths of pipe, bent upward at the ends, are the only materials required for a set of de-



A Pair of Gas-Pipe Runners for the Baby Carriage Makes It Almost Instantly Convertible into a Sleigh for Snowy Weather. It Is Only Necessary to Remove the Wheels and Slip the Runners over the Axles

tachable runners by means of which the baby carriage can be converted into a sleigh in a few minutes.

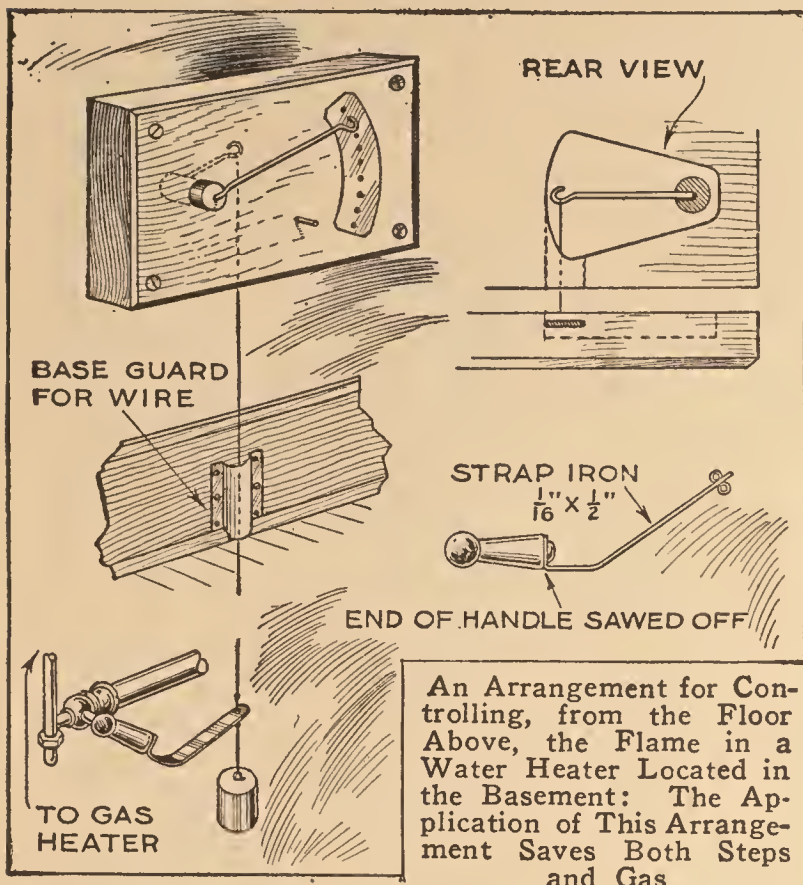
To attach or detach the runners, it is only necessary to remove the nuts and washers that hold the wheels, slip on the runners and replace the nuts, although in some cases it is possible that larger washers will be needed on each side of the tee, to hold the runners rigid when the nut is turned down. If some form of catch is employed instead of nuts to hold the wheels, it may be necessary to cut a groove in the inner ends of the tees to take the catch. This is easily done, however, and will not worry the amateur mechanic. The size of the tees used, and, therefore, the pipe size, will be determined by the diameter of the axles.—Clare B. Smith, Chicago, Ill.

Stiff Collars Made into Soft Ones

Most stiff linen collars are discarded at the slightest sign of wear, although in this condition they can be made to give weeks of extra use by converting them into soft collars. This is done by boiling out all the starch, making neat repairs where needed, with silk thread, and laundering in the usual manner for unstarched work.—S. S. Sutherland, Detroit, Mich.

Step-Saving Water-Heater Control

The water-heater regulator illustrated is one that has resulted in saving many steps between the first floor and basement



of a residence, and that has also effected a saving in the amount of gas consumed. The construction of the regulator is simple, and involves nothing that cannot be made by the home mechanic. An extension is attached to the gas-cock handle, as indicated, and this is connected by a wire to the controlling arrangement on the upper floor. The controller consists of a U-shaped wire lever mounted on a wooden block attached to the wall. One end of the lever is bent at right angles, and its position is adjusted and maintained by inserting this projection into holes drilled in a metal plate and into the block. A weight is attached to the underside of the valve-handle extension, so that should the wire break, or the lever become loose, the gas will be turned off automatically.—Donald W. Clark, Buffalo, N. Y.

A Hint for the Auto Painting Job

When the automobile is given a coat of paint at home, the most important thing is to keep dust from settling on the paint before it has dried. The old finish should be sandpapered and carefully wiped off, to make the surface as smooth as possible and remove all dust and dirt. Before applying the paint, tack paper over all cracks and crevices in the garage that might let in dust from the outside;

then, if an especially dust-free job is desired, make a frame of light lath, big enough to stand on the floor and cover the car and at the same time leave room to work. Cover this frame with thin paper—light will come through the paper but dust will not. Save a new brush and an unopened can of varnish for the finishing coat on the body and fenders, and when the painting job is completed, do the finishing work under the covered frame.—J. Paul Suter, Youngstown, Ohio.

Removing Wire Wheels

Owing to a puncture, it was found necessary to remove one of the wire wheels on a new automobile that had been driven only a few hundred miles. The nuts on the wheels had been set up very tight, and it was found impossible to unscrew them by simply pulling on the spanner wrench, with the wheel jacked up. The nut was finally unscrewed by the following method:

The jack was removed and the spanner set on the nut so that its handle was horizontal; then the jack was set under the end of the handle. By “pumping” on the jack, the end of the handle was raised slowly, while the wheel revolved, slipping over the road surface. By proceeding in this manner, the nut was loosened sufficiently to enable it to be entirely unscrewed without difficulty by turning the spanner by hand.

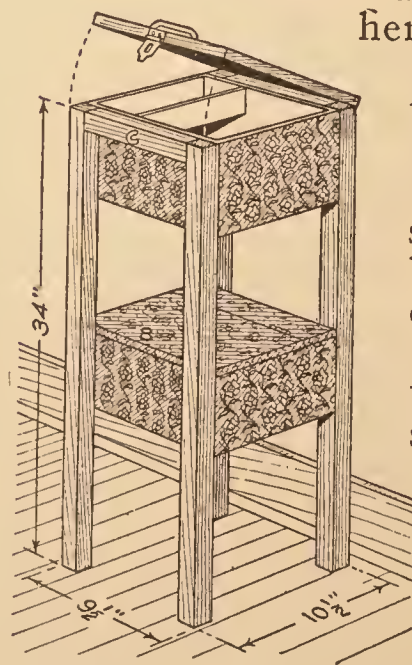
An Easily Made Sewing Stand

The sewing stand shown in the drawing is the outcome of a woman's inability to obtain an article suitable to

her requirements. It is made from two wooden cocoa-packing cases of the same size. After the outside of the boxes had been covered with cretonne glued to the wood, hinged lids were provided and similarly covered.

The wooden legs are about 1-in. square, and are fastened to the boxes from the inside, with screws.

The top section is provided with a neat brass hasp so that it can be locked.—T. H. Lynn, Hyattsville, Maryland.



Cleaning Ceilings

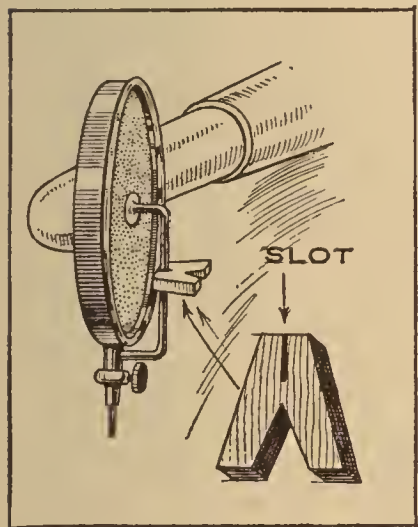
To clean smoke, dirt, grease, fly specks, etc., from a painted ceiling or wall, make a mixture of vinegar, baking soda, and a little table salt, and rub the grimed surface with it. Follow by washing off with warm water and soap, and wipe dry, using a soft rag. This method is also good for enameled baths, glass, and white porcelain.

Test for Water in Gasoline

Water will "lick" molasses off a stick, gasoline will not; and water, being heavier than gasoline, sinks to the bottom of a tank. On these principles a simple test for water in gasoline has been evolved by a state inspector. A stick is coated with molasses and plunged into a gasoline tank. If there is water present it will show up as a bare section on the gauge when withdrawn, the length of the bare wood indicating the depth of water. —Hjalmer Lindquist, Minneapolis, Minn.

Softening Tone of Phonograph

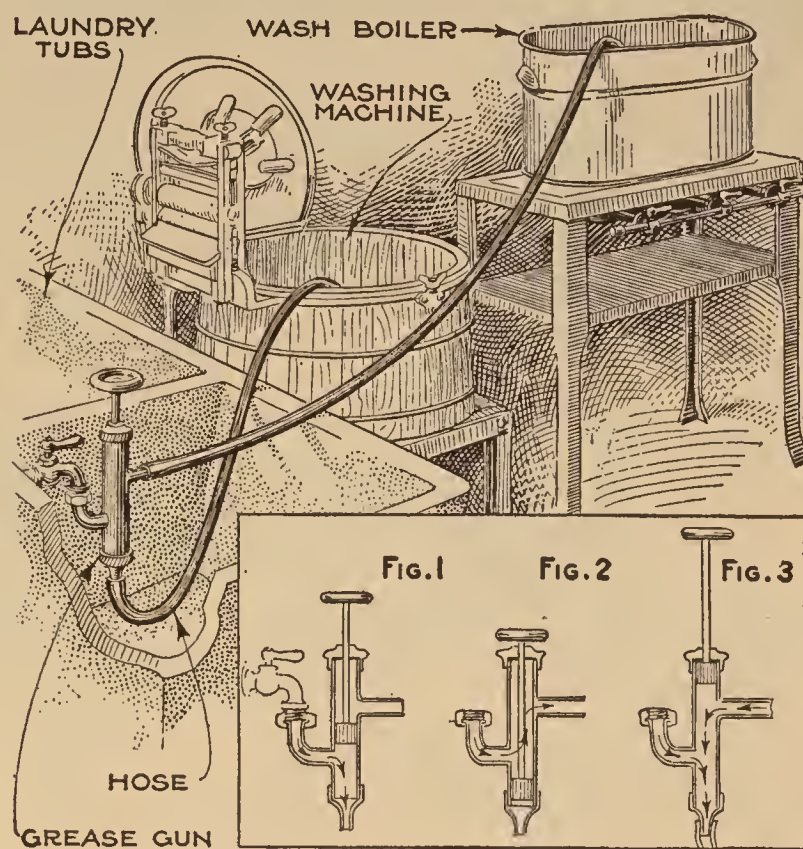
The attachment shown in the drawing is cut from a piece of thick sheet rubber, leather, or similar flexible material, in the form shown, and fitted over the needle bar of the phonograph reproducer to subdue the tone of the instrument. In applying or removing the "mute," for such it properly can be called, the ends are pressed together by the fingers; this expands the slot in the opposite side and makes its application or removal very simple.



Laundry Siphon Made from Grease Gun

A washing machine or boiler can be filled or emptied easily and without dipping the water by means of the novel siphon shown in the drawing. An ordinary grease gun was obtained and elbow and hose connections were brazed to the side of the cylinder. The siphon is screwed to the laundry-tub faucet, and, with the piston in the position shown in Fig. 1, the water flows through the nozzle at the bottom and may be con-

ducted into any receptacle, or used, with the hose removed, for filling the stationary tub. With the piston in the position indicated in Fig. 2, the water flows



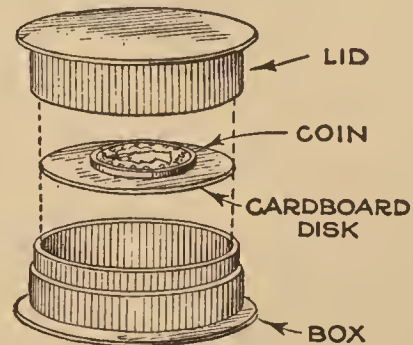
By Brazing a Hose Connection and Nipple to the Cylinder of an Ordinary Grease Gun, a Laundry Accessory is Produced That will Drain or Fill the Washing Machine, Boiler, or Other Vessels

through the upper tube. To drain the washing machine or boiler, it is only necessary to raise the piston to the position shown in Fig. 3 and turn on the water, which will suck the dirty water out into the stationary tub. —J. G. Brown, Evanston, Ill.

The Magic Pill Box

The magic pill box makes coins disappear and return at will; the trick is very simple, and any pill box can be fixed for performing it in a few minutes.

Get a regulation round pill box, and cut a cardboard disk just large enough to fit into the bottom. Drop a coin in the box and put the lid on; then, turn it upside down and shake it, calling attention to the fact that the coin is still there, by the rattling inside. Now, pull the box apart, holding the lid in the left hand, so that the cardboard disk covers the coin, which has vanished. Then, still holding the lid upside down, put them together again and reverse the operation, holding the bottom in the right hand; upon opening the box the coin will reappear.



A Small-Lathe Countershaft

BY J. V. ROMIG

INSTALLING a small bench lathe in the shop of the experimenter or model maker, has caused many an amateur me-

Both ends of the tee are dammed to prevent the melted metal from flowing out; this may be done by fitting a cardboard

disk over the shaft, against the end of the tee, and holding it in place with putty, or with a metal collar screwed against the tee. The opposite end is similarly dammed. A lip-shaped opening must be provided at the highest point of the dam for pouring the metal. If properly made, such bearings will require but very little aftertreatment to obtain a true-running bearing. The countershaft and its pipe standards are assembled, as shown in the drawing, with collars against the bearings to prevent end play.

For small lathes up to 6-in. swing, a 1/4-hp. electric motor is perhaps the

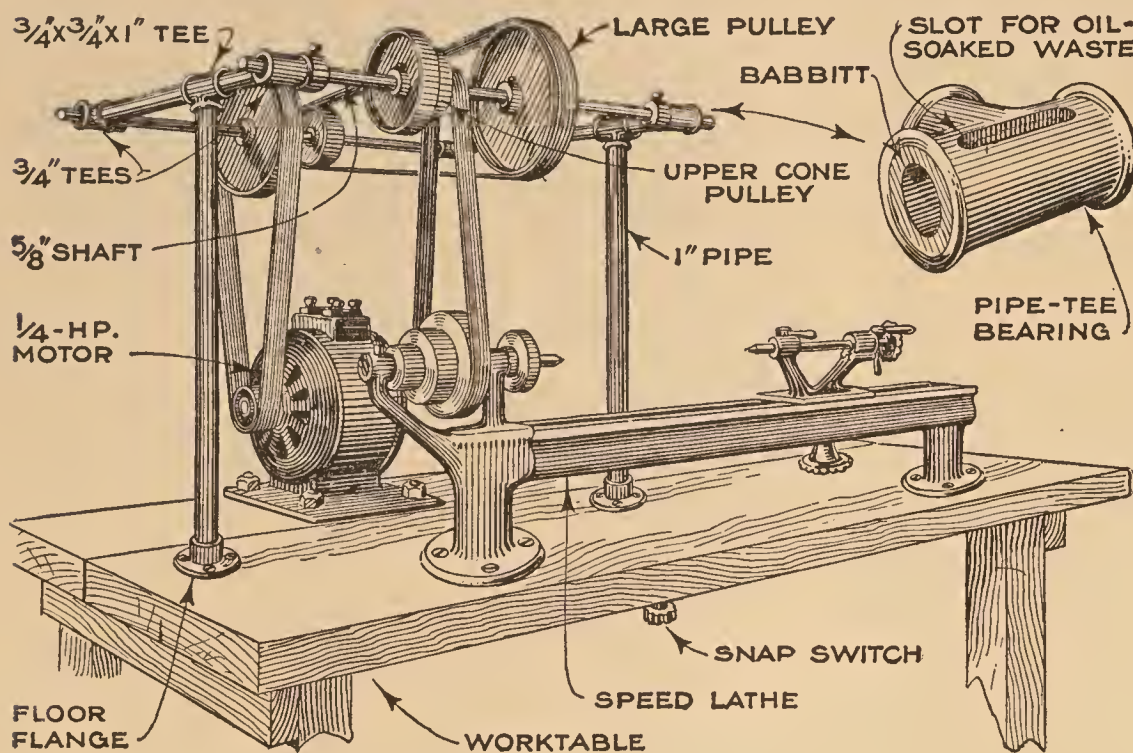
most satisfactory source of power, and this is bolted to the bench, back of the headstock. A snap switch of suitable capacity can be mounted at a convenient location underneath the bench, for controlling the operation of the motor.

If it should be undesirable, for any reason, to have the countershaft mounted on the top of the bench, several modifications of this arrangement are possible, and will suggest themselves to the builder. The same idea can be carried out by inverting the arrangement and bolting it to the underside of the bench, or to the floor under the bench, cutting slots on each side of the headstock and bringing up the belts from underneath.

Aid for Feminine Motorists

When motoring in a brisk breeze, many women are bothered by the problem of preventing the skirts of light and thin dresses from blowing up. With both hands occupied it is impossible for the feminine driver to keep tucking her skirts under her.

A clever girl conceived the idea of taking an ordinary paper clip and fastening the front and back hems of her skirt together after she had seated herself in the car. Thus, her limbs are left free to manipulate the foot pedals and her hands



Setting Up a Small Bench Lathe in the Experimenter's Shop is Accomplished without the Use of an Overhead Countershaft. The Countershaft is Supported on an Easily Made Standard and Bearings Made of Iron Pipe and Fittings

chanic to lie awake nights figuring how to avoid overhead countershafts, with their attendant long belts, particularly when the lathe is to be operated by a small electric motor. A system that has been satisfactorily used for several such installations eliminates entirely the countershaft fastened to the ceiling, and substitutes for it an easily constructed and economical arrangement made of iron pipe, and secured to the bench as shown in the drawing.

Two lengths of 1-in. pipe of the proper length form standards for supporting the countershaft; one end of each is fitted with a floor flange, the other with a 3/4 by 3/4 by 1-in. tee. Pipe nipples of the proper length are screwed into the tees, and a 3/4-in. tee is screwed onto each end of the T-shaped assembly of pipe and fittings; these latter tees are lined with babbitt for shaft bearings.

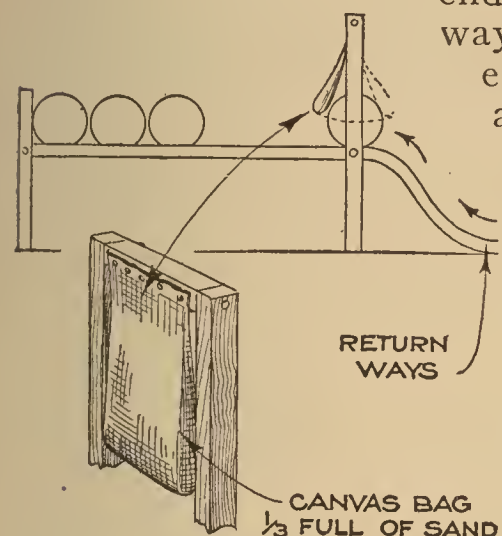
Slots are cut in each of the bearing tees and plugged with pieces of wood, which must reach to the shaft before the babbitt metal is poured; the blocks are later removed, and the resulting slot is packed with oil-soaked waste.

In pouring the babbitt bearings, the shaft is inserted into the tees and blocked up so that it will be central. The shaft is wrapped with a single thickness of paper to prevent sticking after the metal cools.

can be kept where they belong—on the steering wheel. The slight weight of the clip, added to the fact that the front of the skirt is fastened to the back part, which does not sag down so far in the car, helps to hold the skirt easily, and there is no sense of weight or restriction of movement.—Ethel Van Cise, San Diego, Calif.

Retarder for Bowling Balls

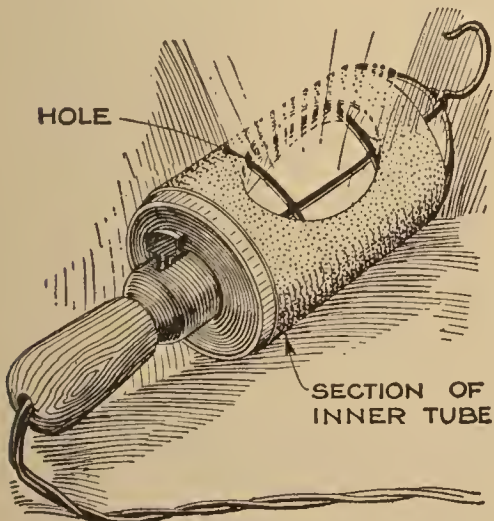
To prevent bowling balls from coming together too hard when they reach the end of the return ways, thereby shortening their life and making an unnecessary amount of noise, the proprietor of a set of alleys rigged up the retarder shown in the drawing.



Two upright pieces, connected by a crosspiece, were fastened to the sides of the ways, and from the crosspiece a canvas bag, about a third filled with sand, was suspended in such a manner that the bottom was in line with the center of the ball. The velocity of the ball is reduced when passing underneath the bag to such an extent that it rolls into place easily and almost noiselessly.—Geo. A. Volz, Monroe, Mich.

Shade for a Trouble Lamp

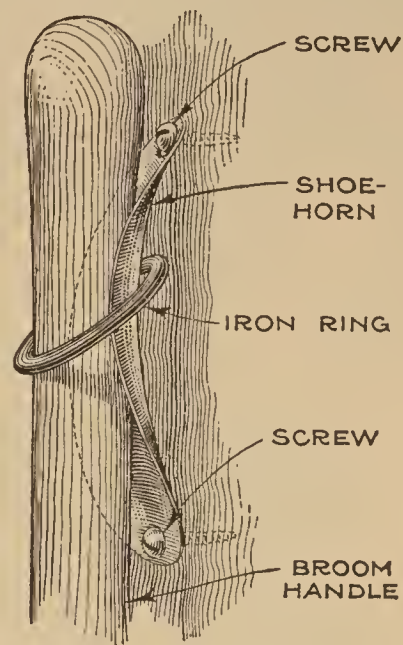
To shade a trouble lamp that is protected from damage by a wire guard, a suitable piece of an old inner tube that has a hole cut in one side and pulled over the guard, as shown in the drawing, will serve very well. The hole can be cut to permit the passage of as



much light as desired without having it shining into the workman's eyes. Besides serving as a shade, the rubber is also an additional protection for the bulb.

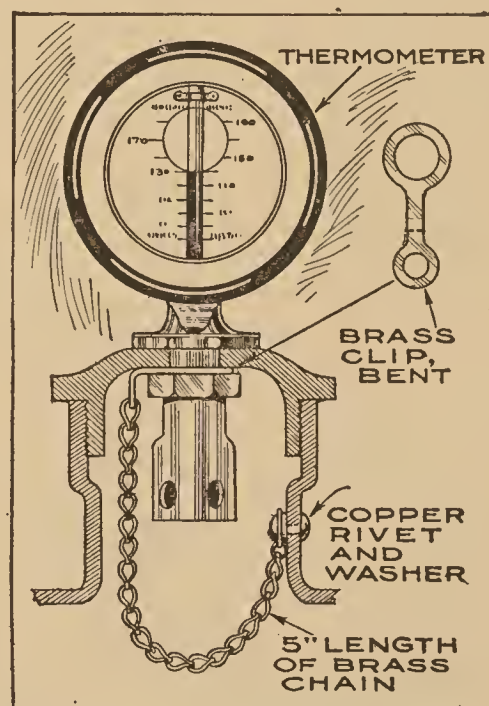
Broom Holder Made from Shoehorn

An iron ring, such as is commonly known as a harness ring, and an ordinary shoehorn can be converted into a very satisfactory holder for brooms, mops, and similar round-handled articles. As shown in the drawing, this particular form of holder is simplicity itself; the ring is slipped over the small end of the shoehorn, both ends of which are then fastened to the wall with screws. Roughening the inside of the ring will improve its grip on the handle of the broom.—M. H. Bolsinger, Johnstown, Pa.



Locking the Radiator Cap

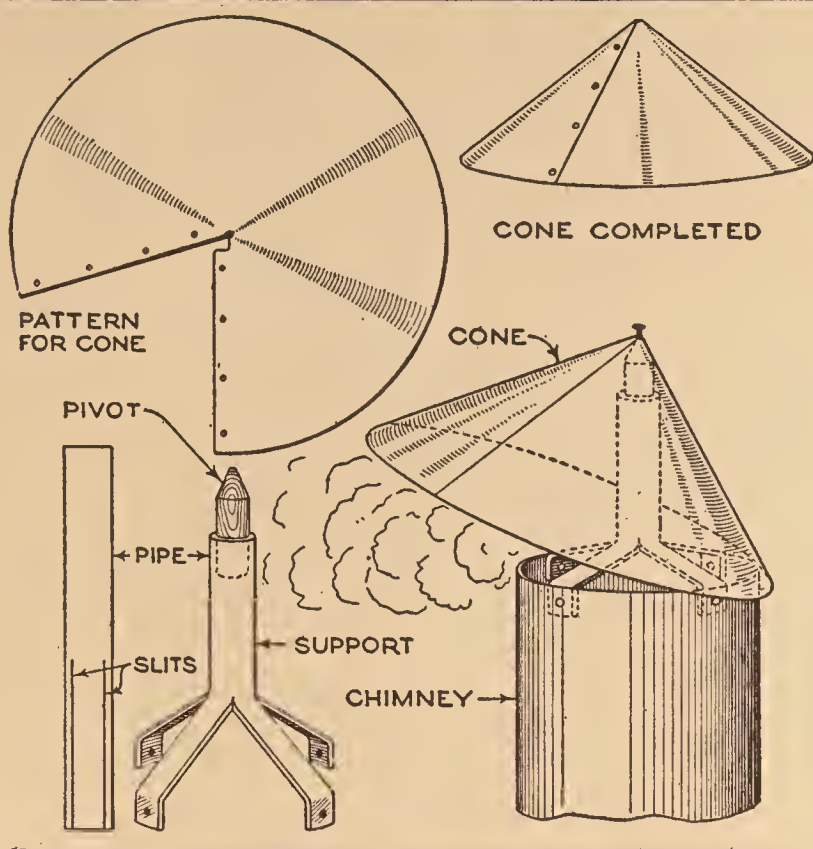
Radiator caps of automobiles that are fitted with thermometers for registering the temperature of the cooling system, and for giving warning of overheating, are expensive enough to attract the attention of the "doormat" type of thief. A simple protective measure consists in attaching a short length of light brass chain to the instrument



A simple protective measure consists in attaching a short length of light brass chain to the instrument and the radiator-filler tube, in such a way that the cap can be unscrewed for filling the radiator, but cannot be dropped or carried away. A brass clip is cut to the form shown and screwed underneath the nut that holds the thermometer to the radiator cap. One end of the chain is fastened to this clip, and the other is riveted to the neck of the radiator. While it is possible to cut the chain with a pair of wire-cutting pliers, the thief, finding the cap secured, will more than likely seek easier booty.

A Simple Stovepipe Cap

The chimneys of most summer kitchens are mere stovepipe extensions beyond the roof or walls of the building,



A Simple Cap for a Stovepipe Chimney That Not Only Increases the Draft and Prevents Water from Entering but Keeps the Stove from Smoking

and should be provided with rain caps, to prevent water from entering and causing them to rust rapidly. Stationary caps, while suitable for the purpose, cause the stove to smoke more or less in windy weather. Of course the location of the building in relation to surrounding structures has much to do with smoking chimneys and imperfect draft. However, the simple wind and rain deflector illustrated will insure against such annoyances.

A piece of 1-in. pipe, about 8 in. long, and a 12 by 12-in. sheet of heavy tin or galvanized iron, with a few stove bolts, or rivets, are the only materials required. The pipe is slit with a hacksaw to a depth of 4 in., as shown, and the four quarter sections thus made are bent at an angle to the remaining section, the bent part being heated to make the work easier and prevent breaking. The ends of the projections are turned down 1 in. from the end and drilled to take suitable bolts or rivets, as indicated. A wooden plug is driven tightly into the upper end of the pipe and tapered off as indicated. The standard thus made is bolted or riveted to the stovepipe.

The conical cap is cut from the piece of sheet metal provided, the edges being drawn together and riveted or soldered,

and the completed cone is placed on the pivot and held in place by a nail driven into the wooden plug.

The slightest wind will operate the cap, causing it to tilt against the windward side of the pipe, so that the draft is increased and back drafts prevented.

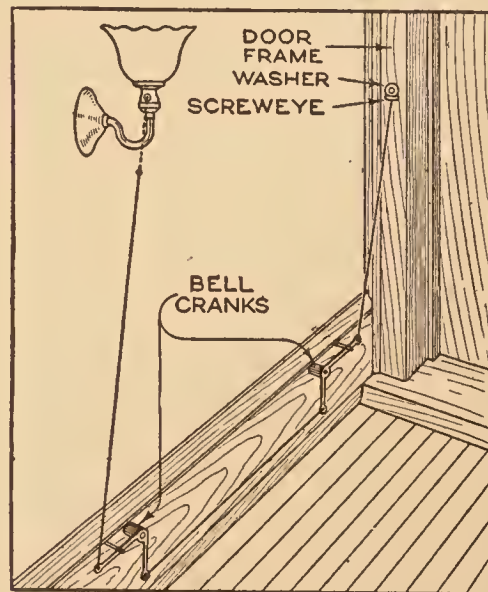
Identification Mark on Tires

An aluminum slip on which the name of the owner is stamped can be placed in the mold when a section is being vulcanized into a tire, and provides a means for permanently marking the tire with the name of the owner pressed into the rubber. Nameplates of the type in question are produced by slot machines more or less generally located in public places and amusement resorts, and cost only a few cents. If desired, the name of the repairman can be used.

When the tire is ready for vulcanizing, the nameplate is placed in the mold, face out, and then the tire. The nameplate can be used indefinitely, and the same idea can be applied to a number of different methods of marking and identifying tires.

Extension for Pull Chains

An inconveniently placed electric light can be quickly changed to be the most convenient in the whole house by using the idea illustrated, or some variation of it.



Two bell cranks, having 2½-in. arms, are fastened to the baseboard, and connected to each other and the pull chain of the

lamp socket by means of a cord. Another cord is run up through a screweye on the door frame, and a washer tied to the end of the string to keep it from falling through. A small washer behind each of the bell cranks prevents them from binding against the wall.

Before this extension pull chain was installed, it was necessary to walk around the bed in order to operate the light, but with the extension, the light can be turned on from the doorway.

Muting a Banjo

In the rendition of some selections, or under circumstances where the loud tone of a banjo is more or less objectionable, the instrument can easily be muted to give a more subdued tone. All that is necessary is two five-cent pieces; these are interposed between the ends of the bridge and head of the instrument.

How to Build an Adjustable Bridging Condenser

An adjustable bridging condenser for wireless work, that will serve as well as the high-priced manufactured articles on the market, can be built easily and economically. It will work in the ground lead in C. W. transmission sets, but when used for this purpose, the mica should be of the best quality, and all units, when clamped together, should be tested out with 500 volts of direct current before installation. This condenser works nicely in receiving sets, and can be made in various capacities, which are cut into and out of the circuit by the fan switch.

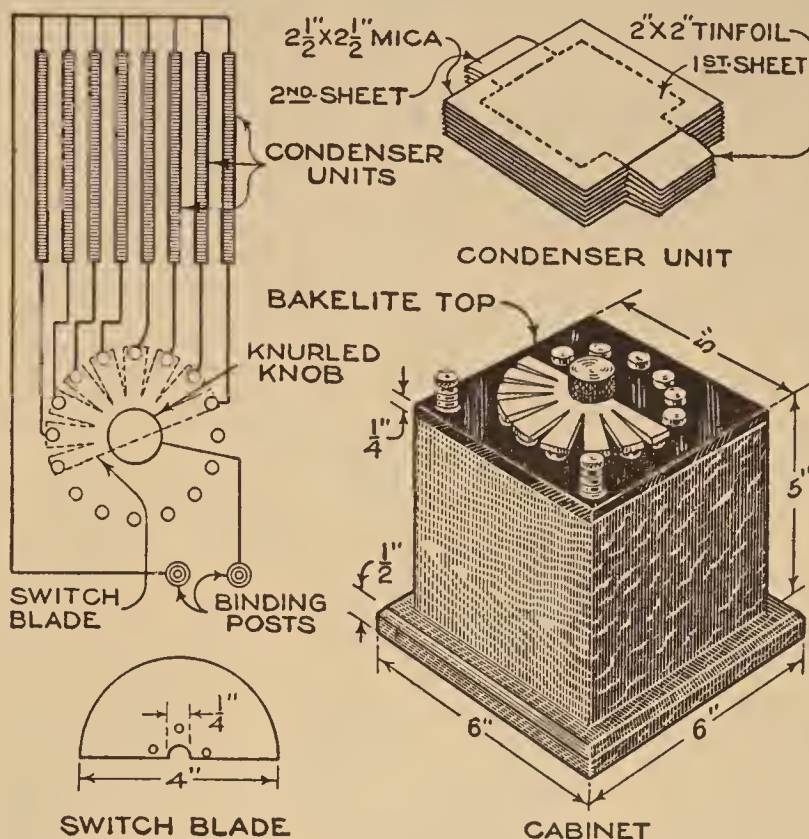
The eight condenser units are made up of 2-in. squares of tinfoil, clamped between $2\frac{1}{2}$ -in. square mica sheets. Make one unit with five sheets of foil and the remaining seven with three sheets of foil each. The foil sheets are cut out with a tab at one edge which projects beyond the mica plates.

In assembling the first unit, a mica sheet is laid on the table, a tinfoil sheet placed on it with the tab projecting to the right, another mica sheet placed on top, and the next tinfoil sheet placed with the tab pointing to the left, and so on until the five sheets of foil and six sheets of mica are assembled. The remaining units are assembled in the same manner, the tabs of the alternate sheets being brought out at opposite sides.

After assembling each unit, bind it with electrician's tape, or bolt the whole number of units together between metal plates and impregnate with paraffin. The foil tabs are all brought together at the ends and a lead wire soldered to each, the whole being bridged at the back, as shown, and the leads brought out to contacts in the bakelite top of the cabinet; 16 points are used, eight of these are idle or dead taps, and merely serve to carry the switch blade smoothly. The switch blade is formed from sheet aluminum and screwed to the underside of the switch knob. If sheet aluminum is not to be had, use one of the fixed plates of an ordi-

nary variable condenser, and saw out the radial teeth, as shown. The five-sheet unit is connected to the first point, shown at the left in the wiring diagram.

The cabinet is made from $\frac{1}{4}$ -in. stock to the dimensions given, and the lead

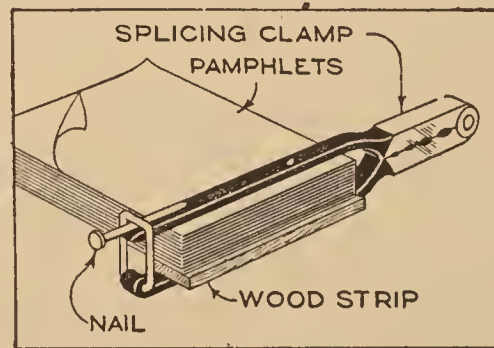


An Efficient Bridging Condenser That can Easily be Built at Low Cost and That will Work Well in the Ground Lead of Continuous-Wave Sets: It Works Nicely in Receiving Sets and can be Made in Various Capacities

wires are brought to binding posts in the top. The cabinet should be finished to correspond to the finish of the other instruments. This condenser can also be back-mounted on the panel, instead of making it into a separate unit, if so desired.—F. L. Brittin, Chicago, Ill.

Clamp for Bookbinding

In casting about for a clamp to hold a number of loose pamphlets that were to be bound together in the form of a book, a pair of lineman's wire connectors was found to be just the thing. The connectors



were a little wide between the handles for the thickness of the number of pamphlets, so a wooden strip was placed against one handle. The pamphlets were evenly placed and the other handle brought down and the clamp link sprung over the end. As the link did not hold the pamphlets together tightly, a nail was inserted, as shown, and the binding cloth applied.

Making Bearings for Model Machinery

By HOWARD GREENE

THE weak point of much model machinery is in the bearings, which are frequently made of pieces of sheet metal with holes drilled for the shafts. Brass channel-bar stock is much better for this work and is susceptible of a variety of treatment; it is much easier to work with than solid bar stock, as well as lighter and cheaper.

To make a plain bearing, as shown in Fig. 1, cut a piece of the channel to the length of the box, plus twice the height, or a little more, to allow for finishing up. Cut away the flanges at both ends for a distance equal to the height of the box, and bend the remaining strip at each end

If extra rigidity is needed, the bearing may have three feet, instead of two, by bending out the web instead of cutting it off. If desired, the hole for the shaft may be drilled through the babbitt filling, omitting the tube entirely. Another method of making a high bearing is to proceed as in Fig. 1, but the projecting parts of the web are made longer and run down the sides of a neat block of wood, or fiber, as shown in Fig. 3.

Quite an elaborate type of bearing is made as shown in Fig. 4. Two pieces of channel are cut and feet are formed as indicated; a single foot can be made from the web, if extreme rigidity is not an es-

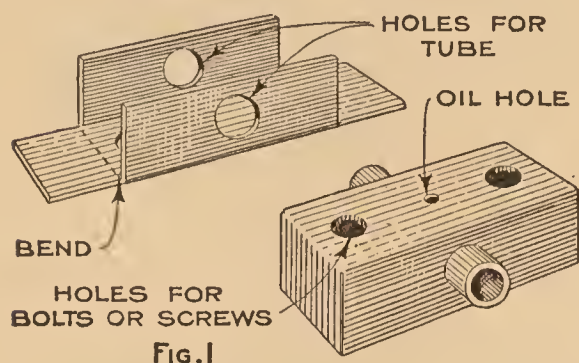


Fig. 1

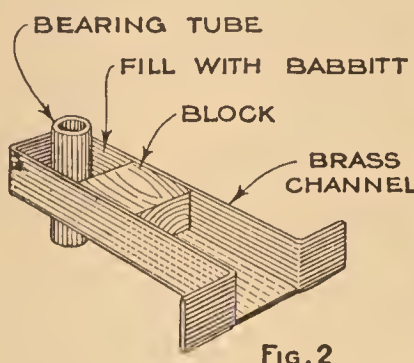


Fig. 2

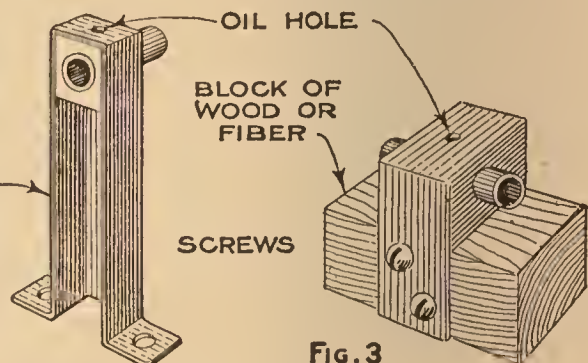


Fig. 3

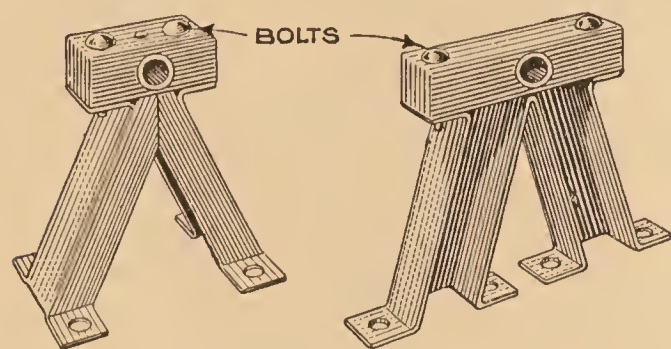


Fig. 4

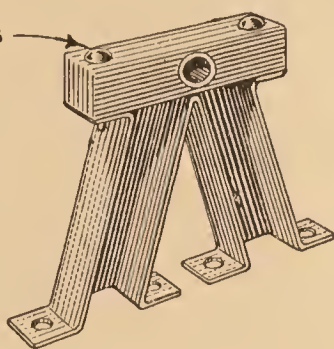


Fig. 5

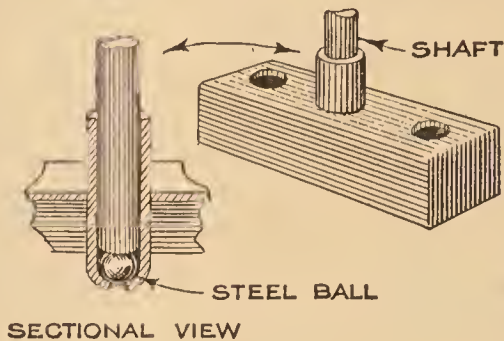


Fig. 6

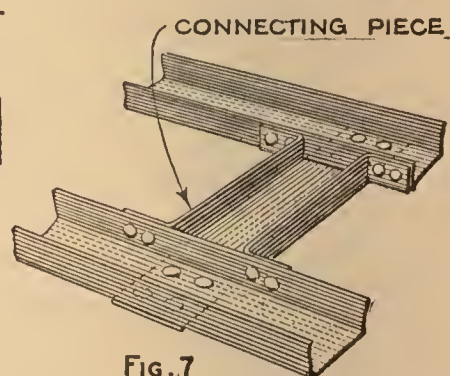


Fig. 7

The Bearings in Model Machinery Are Frequently the Weak Points. Brass Channel Bar Is Extremely Useful for Making Bearings That Are a Distinct Addition to the Appearance, Rigidity, and Durability of the Model. Figure 7 Shows How Pieces of the Channel Bar are Riveted Together

over until the ends are closed. For the actual bearing, a piece of brass tube of the right size is forced into the holes through the flanges, as shown. Leave the tube somewhat longer than the width of the box to improve the appearance.

Figure 2 shows a high bearing. Cut away the central part of a piece of the channel, called the web, and bend the flanges outward to form feet, then drill them for the holding-down screws. At the desired height drill for a bearing tube and force the tube in. The top of the channel is to be closed by cutting away the flanges for the necessary distance and bending over the web; then insert a wooden block in the channel, a little below the tube, and fill the space between the top and block with melted lead, babbitt, or type metal. File off the end of the tube flush with the webs on either side.

sential. The bearing itself may be of the type shown in Fig. 1. A variation of this construction is shown in Fig. 5, and this, in many ways, makes a better job, as far as rigidity is concerned.

A thrust, or bottom, bearing for a vertical shaft is made as shown in Fig. 6. A piece of channel is prepared as for the bearing in Fig. 1, but is drilled for the tube through the web instead of through the flanges. Before inserting the tube, one end of it is partly closed by turning over the edge, to hold a steel ball as large as the tube will accommodate. Put the tube in the channel, with the ball end flush with the edges of the flanges, and fill in the channel with babbitt, or solder the tube in place. The end of the shaft should be made perfectly square. If a lathe is available, chuck the shaft, perfectly true, and form a rounded end to

bear against the ball, to secure the minimum of friction.

While channel stock is under discussion, it may be well to indicate a good way of attaching two pieces together. The connecting piece is split on the corners and the flanges are bent outward at

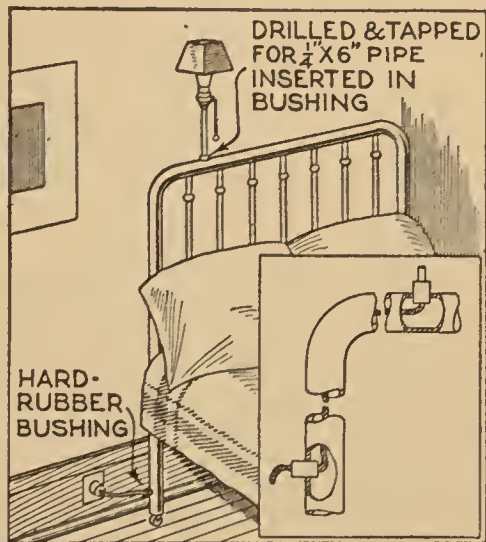
right angles, the web being left straight. The flanges and webs are riveted to the parts to be connected with small brass rivets as in Fig. 7. Incidentally, the small brass nails known to the hardware trade as "escutcheon pins" make excellent rivets for such light work.

Testing Height of Electrolyte

The electrolyte in storage batteries must be kept at a uniform height above the plates at all times for the most efficient operation; if the electrolyte is below a certain level, distilled water must be added to bring it up again. To determine when the cell is filled to the usual height of $\frac{1}{2}$ in. above the plates while the battery is in position, and where the light is poor, a piece of glass tubing, about 8 in. long, can be used. The tube is inserted into the cell until it presses against the plates and the first finger is placed over the upper end. Holding the finger over the end of the tube, the latter is withdrawn, and the level of the solution held in it will indicate the depth to which the electrolyte covers the plates.

A Convenient Bed Light

For the comfort of invalids, or those addicted to reading or writing in bed, the bed light shown in the drawing was devised. The actual installation is quite simple and consists in leading the electric-light wire through the tubular bedpost in the manner shown. A

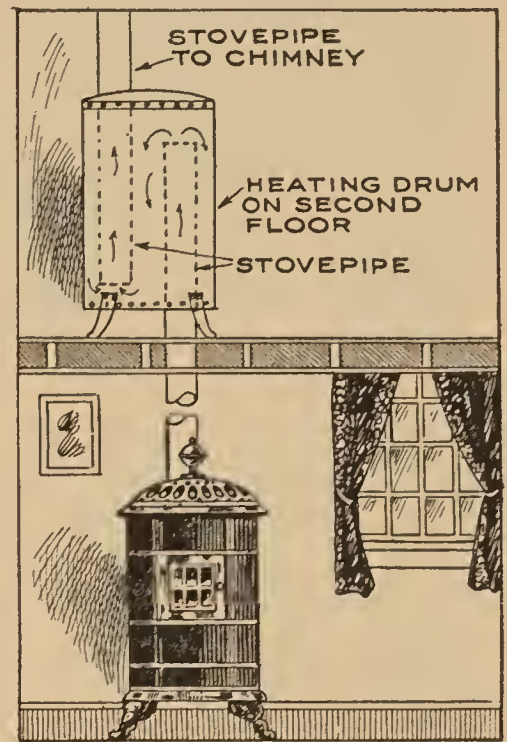


hole is drilled and tapped near the foot of one of the posts and fitted with an insulating bushing for the wire, which is passed through the post and out of a similar hole in the top of the bedstead. The latter hole is drilled and tapped for a bushing, into which a suitable length of $\frac{1}{4}$ -in. pipe is screwed to form a support for the lamp. The outer end of the pipe is threaded and an ordinary chain-pull light socket is attached and wired. A plug on the end of the wires to the lamp is screwed into a flush-plug receptacle.—Truman R. Hart, Ashtabula, Ohio.

Heater Made from Old Tank

The illustration shows how a discarded steel tank was put into service for heating a room on the second floor of a dwelling.

Four legs were riveted to the tank and a hole was cut into each end just large enough to admit a stovepipe. The bottom stovepipe conducted the heat and smoke into the tank from the stove below,



the pipe being inserted to within a few inches of the top. The smoke escaped through the second stovepipe which was inserted through the hole in the top of the tank, as indicated.

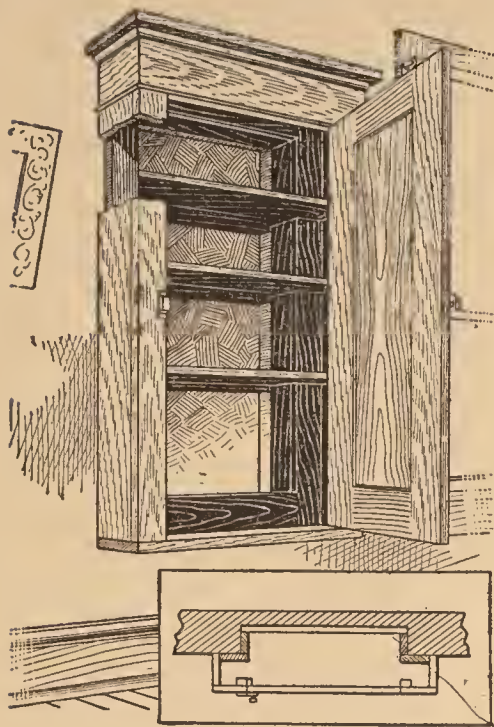
Pipe Coils in Hot-Air Furnaces

The installation of a few coils of pipe in heating furnaces, to provide hot water, is quite common, but many are finding that the running in of the pipe into the firepot at the side of the dome, or heated surface, and out again to the water heater is more or less dangerous unless a tee connection is made on the lower pipe as it leaves the furnace, and a faucet screwed into the outer end of the tee.

The use of the faucet will eliminate all the common troubles of this method of heating water. The coil is bound to clog up more or less during the summer months, and when heated continually it is only a short time before serious damage will be done to the whole furnace. The faucet will permit frequent draining, and as these heating coils are usually of small-diameter pipe, cleaning is often an absolute necessity if the system is to work at all.—L. H. Georger, Buffalo, N. Y.

Enlarging a Shallow Cupboard

A shallow cupboard, built into the partition separating two rooms, was enlarged



to more than double its former capacity by the simple method illustrated, the finished work forming a distinct addition to the furniture of the room. In carrying out the work, none of the original cupboard framing was removed with the exception of the door,

which was made to do service in the remodeled job without alteration. The new woodwork was fastened directly to the edges of the original woodwork, as shown in the plan view, thus increasing the width and height as well as the depth of the cupboard.—Philip Myers, Baltimore, Maryland.

Lamp Made from Artillery Shell

A soldier of the World War cherishes an 18-lb. artillery shell as a souvenir of his experiences, and this he has converted into the good-looking table lamp shown by the photograph. A hole was drilled through the nose and this was tapped to receive the supporting standard and lamp cluster. The base upon which the shell rests was turned from a piece of black



walnut and appropriately finished.—Edgar Downie, College Point, N. Y.

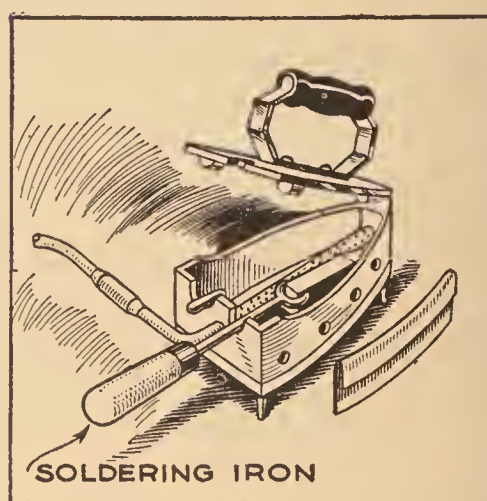
Sandpaper Used for Bushings

The following method of repairing a push-bit pipe, the joint of which had become worn and loose, proved very satisfactory. A small strip of sandpaper was cut to the proper size, and placed in the stem end of the pipe bowl, with the rough or sand surface out. The stem

or bit was then fitted in, and as the thickness of the sandpaper made the bushing too thick, the stem was filed to fit. The rough surface of the sandpaper will prevent the bushing from coming out when the bit is removed for cleaning. Sandpaper bushings can be used for many purposes, such as repairing loose chair legs and the like.—R. B. Clifton, Denver, Colo.

Gas Iron as Heater for Soldering Bit

The drawing shows the manner in which I use an ordinary gas iron to heat a soldering bit. The fact that the iron is so used does not interfere with its service in the laundry. Therefore, either



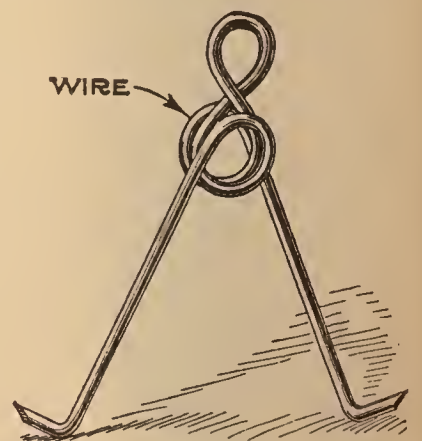
an old or a new iron may be used.

By turning the pipe to which the gas hose is connected to one side, the flame is forced directly onto the soldering iron. To help keep the heat in the

gas iron, it is best to make two side-pieces similar to those shown; these are slipped over the sides and cover the air holes. If the openings in the back of the iron are too small to admit the tang of the soldering bit, it may be necessary to enlarge the hole a trifle by filing.—H. A. Gustafson, Chicago, Ill.

A Simple Skinning Gambrel

For suspending the carcasses of small animals while removing the pelts, some form of gambrel is necessary. The drawing illustrates an original form of skinning gambrel which will not allow the carcass to slip during the skinning, with possible damage to the skin from unlooked-for contact with the sharp edge of the skinning knife. About 3 ft. of steel or brass wire is required to make such an article, which is easily formed by twisting around a stick or piece of tubing, bending the ends, and pointing.

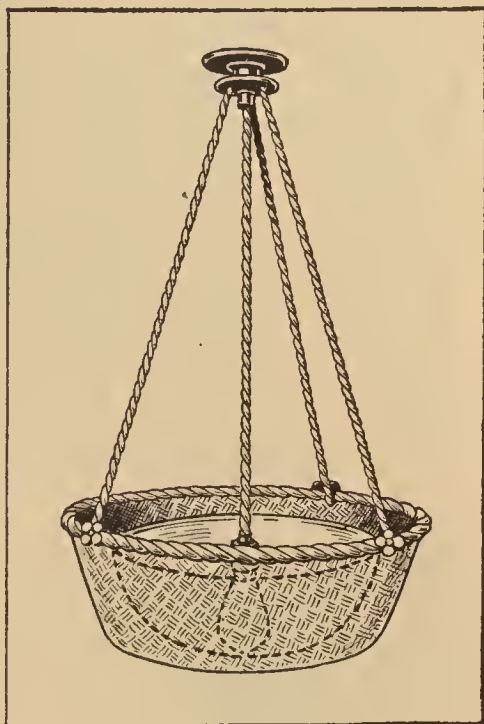


Mildew on Leather

Any leather article is almost certain to mildew if kept in a warm, damp, and dark place, such as a closet, cellar, or stable. This mildewing will probably not seriously reduce the life of the article unless it is allowed to remain too long. It may, however, appreciably alter the color, thus injuring the appearance. The simplest way to prevent mildewing is to keep the leather in a well-ventilated, dry, well-lighted place, preferably one exposed to sunlight. When mildew develops, it should be washed off with soap and warm water, or simply wiped off with a moist cloth, drying the leather well afterward. These simple measures are more satisfactory than the application of preparations designed to prevent the growth of mildew.

A Novel Inverted-Light Reflector

An indirect-lighting fixture, which was made from a wicker basket to harmonize with the reed furniture of a room, was provided with a reflector made from a white china bowl. The handles were removed from the basket, which was suspended from the ceiling by three pieces of hemp rope, painted with gold bronze. The bowl is placed inside the basket. This suggests a use to which a basket with a broken handle, or a cracked bowl, may be put, as the handles are removed from the basket, and the crack in the bowl is not visible from below.

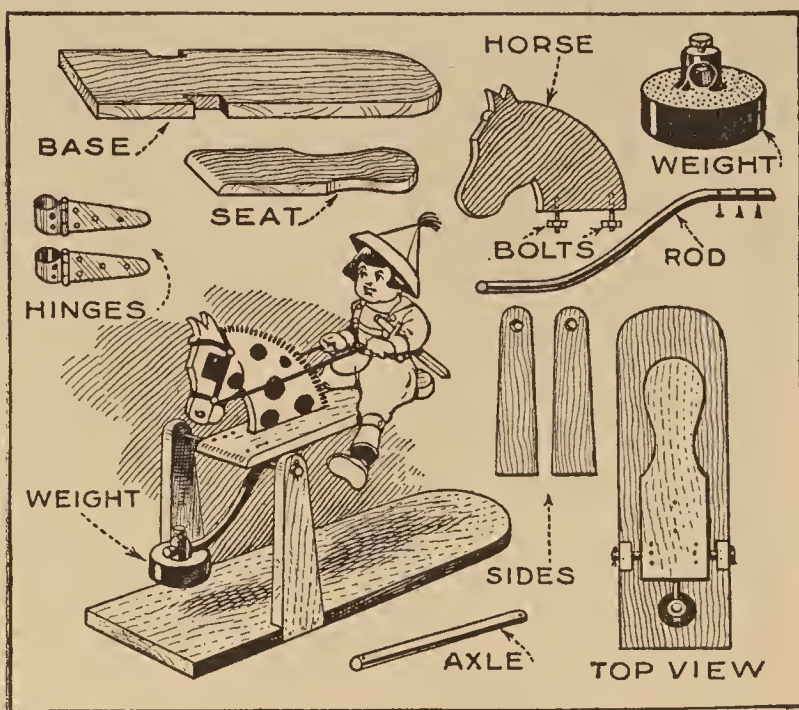


Seesaw Built for One

A single child, seeking means of entertaining itself, has a hard time in getting any pleasure out of the ordinary seesaw.

The drawing shows a combination of seesaw and rocking-horse that can be used by one child. The construction is quite simple, the dimensions and weight of the counterweight being varied to meet

different requirements. The seat is supported on an iron axle by a pair of strap hinges, one end of each hinge being bent to fit around the axle. The counterweight, which may be an iron casting, or



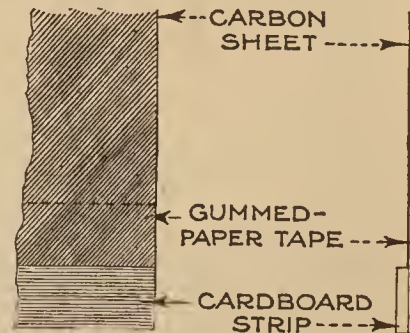
A Combination of Hobbyhorse and Seesaw That Makes It Possible for a Lone Youngster to Entertain Himself: A Counterweight is Provided for Balancing the Weight of the Child and Seat

a block of cement, is attached to a curved iron rod fastened under the front end of the seat. The counterweight should be a trifle heavier than the combined weight of child and board, and a little experimenting will be necessary to strike the correct balance. The exact mass of the weight can be found by first attaching a bucket or bag of sand to the end of the rod, and adding or removing sand until the proper weight has been found.

A Manifolding Aid for Typists

Typewritten manifolds are frequently spoiled when the writing is carried down too close to the edge of the first sheet.

By sticking a strip of gummed-paper tape along the lower edge of the carbon paper, so that half is on the paper, then gumming a strip of cardboard to the projecting edge of the paper strip, the arrangement will



pinch between the platen feed rolls of the machine, and prevent the sheets from rising too far. Do not stick the tape to the carbon surface, and, in use, allow the cardboard to come below the edge of the sheets; just how much depends on the amount of margin desired at the bottom. —Warren Scholl, Cleveland, Ohio.

Closet Concealed by Open Door

Occupants of an apartment in need of additional storage room noticed that a door in one of the halls was rarely closed,



The 14-Inch Space behind a Door is Used to Provide Additional Closet Room. A Set of Shelves was Built to Fit into the Space, and the Closet is Entirely Concealed by the Open Door

and as this door was hinged 14 in. from the wall, it was decided to build a closet in the space behind. The closet itself is a simple affair of two upright boards, which serve as supports for shelves. When the door is open and hooked with a screen-door hook, the closet is entirely concealed. As the shelves are not fastened to the wall, there can be no complaint from the owner and they can be removed at any time.

Lengthening the Life of Auto-Starter Gears

The constant use of the self-starter on an automobile during a period of three or four years will wear off the entering edges of the teeth on the rim of the flywheel, from the "clashing" contact with the steel driving pinion on the starting motor. On a four-cylinder engine, two badly worn spots will be noticeable on opposite sides of the flywheel rim, while on a six-cylinder engine there will be three such worn spots. If this wear is allowed to proceed too far, some of the teeth will eventually be broken, and may cause the complete wrecking of the starting motor.

The worn spots referred to occur between the compression points of an engine and are caused by the rotating starter pinion overcoming the inertia of the dead engine, and the sliding and grinding

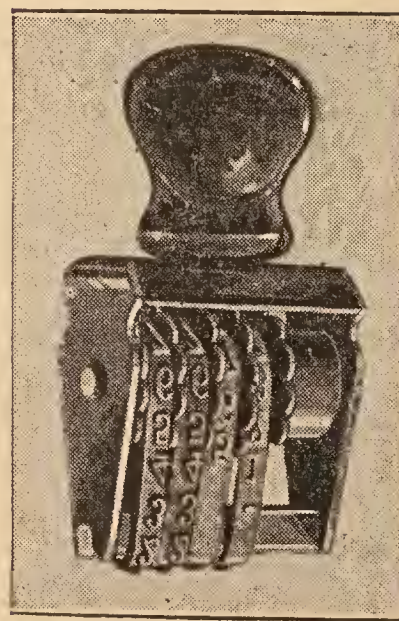
action of the rounded teeth before they have properly meshed with those of the flywheel. This can be stopped and a new lease of life given to the flywheel teeth by removing the flywheel from the crankshaft flanges, and shifting its position a quarter turn on the flange. This will, of course, make the valve-timing markings on the rim of the flywheel useless, and it should be re-marked. As there is no mechanical connection between the flywheel and the rest of the engine except the crankshaft, it makes no difference in what position it stands. This change is best made when the engine is taken out of the car for a general overhauling.

Rubber Mittens for Handling Brick

For rough work, such as handling brick, castings, lumber, and similar materials, damage to the hands from the sharp and jagged surfaces, or slivers, can be largely avoided by wearing mittens made from pieces of old inner tubes. A slit is cut in the side of the tube section; this allows the thumb to project, but protects the fingers and palm. It is unnecessary to close the end of the mitten, although this is easily done with a little rubber cement.—A. Swenson, Los Angeles, Calif.

Consecutive-Numbering Stamp Made from a Dater

An old dating stamp can be used to make a consecutive-numbering machine, which, while lacking the automatic and other desirable features of the regular machine, will answer the purpose in many cases. The date numbers of two stamps can be used, one of the frames being discarded. For numbering up to 99 no change is necessary, except to remove the bands stamping the month and year,



but if numbers of more than two places are required, open up the frame of one stamp and put the numbered bands, with their changing wheels, into the other frame; this combination makes it possible to stamp numbers of four figures.

Double Horn for Autos

The alternating-current horn used on a familiar type of light automobile is not a particularly effective warning at low engine speeds. Many owners of such cars have therefore equipped them with hand-operated horns for use in emergencies.

In such cases, in order to avoid the necessity of having two separate horn buttons in different locations, the electric-horn button can be mounted on the top of the hand horn. By this arrangement, a light pressure will operate the electric horn, while, if a little more pressure is applied, both horns will be caused to sound simultaneously.—D. S. Crabtree, Bridgeport, Conn.

Washing Machine Driven by Engine in a Detached Building

A farmer makes use of the arrangement illustrated for driving the family



Using a Gas Engine Located in a Detached Building to Drive the Washing Machine in the House: Shafts, Extend through the Buildings for the Belt Drive

washing machine, which is located on an inclosed porch of the house, by a small gasoline engine placed in a near-by engine room. Short shafts are run from the washing machine and engine to the outside of their respective buildings, and pulleys are provided for the belt drive, which is used only on wash day.—Dale R. Van Horn, College View, Neb.

A Homemade Magazine Rack

The magazine rack illustrated will be found a great help in keeping the room tidy, and the magazines and periodicals in one place. Each side is cut from a single piece of $\frac{1}{2}$ -in. board. The bottom is made from two pieces of 1-in. board, and is made to slope toward the center. There is a rack across the middle of the stand for holding the books

being read or referred to by members of the family. The magazines slip underneath the bookrack, and as they lie at



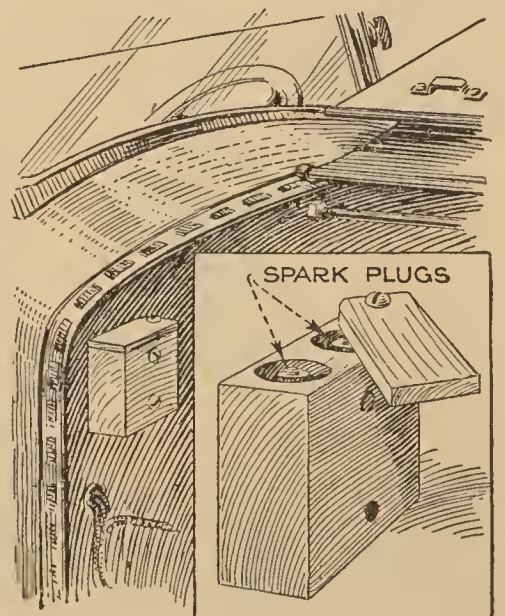
A Homemade Magazine Rack Which Is of Help in Keeping the Room Tidy and the Periodicals in Neat Order

an angle, one can easily read the titles and remove the publications desired without disturbing the others.—C. L. Meller, Fargo, N D.

Container Saves Spark Plugs

Extra spark plugs are often carelessly thrown into the toolbox, with the result that the jack, pump, or other implement is dropped in on top of them, breaking the porcelain, and besides, a litter of tools must be

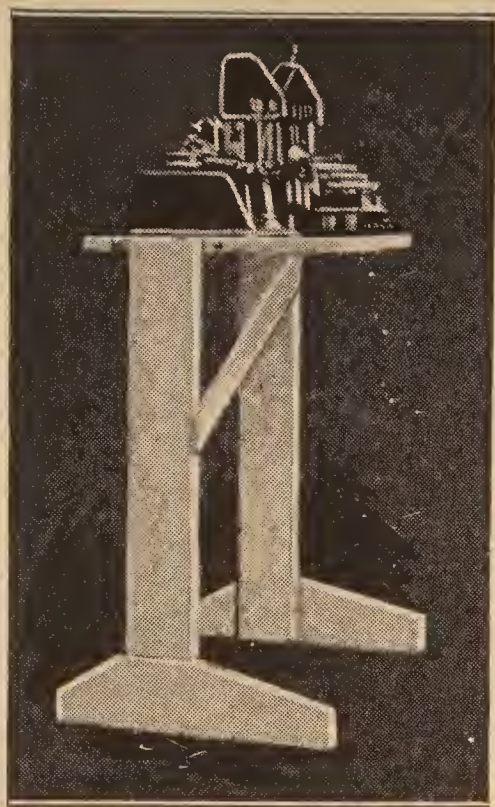
“pawed over” to find the plugs, when needed. A container similar to the one illustrated saves its cost by protecting the plugs against damage, and makes them instantly available. A wooden block,



2 by 4 in. in cross section, and of suitable length, has two $1\frac{1}{2}$ -in. holes drilled in it, is fitted with a swinging cover, and fastened to the engine side of the dash. This container carries two spark plugs, and affords them ample protection.

A Simple Typewriter Stand

The illustration shows how a substantial typewriter stand can be easily made from a few scraps of lumber.

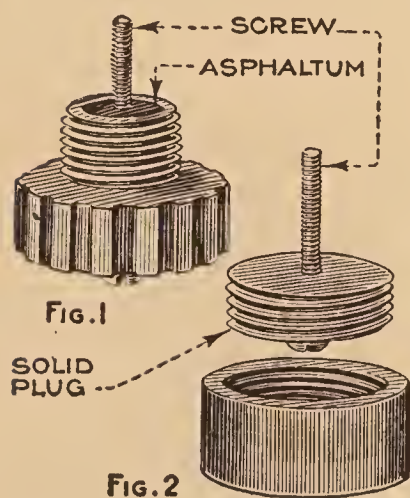


The table consists of two legs with long feet at the bottom, a top for the typewriter to rest on, and a brace across the legs. If the table is assembled solidly, using screws instead of nails, it is quite substantial. It is also neat in appearance and can be finished to harmonize with

the other pieces of furniture.—R. E. Deering, Ottawa, Kan.

Instrument Knobs Made from Storage-Battery Plugs

The radio fan who is pressed for cash while building his set can save a little by making his own instrument knobs from old storage-battery plugs, which can be obtained for little or nothing at almost



any battery station. There are two types of such plugs; those with an outside or male thread, Fig. 1, and those built like a cap, with internal or female threads, Fig. 2. The former are the easiest adapted and are stronger than the latter. Two meth-

ods of attaching the screws to the knobs are illustrated, although others will readily suggest themselves. In most cases it will be found easiest simply to center the screw in the cap and fill the cavity with melted battery-sealing compound, sealing wax, or asphaltum.

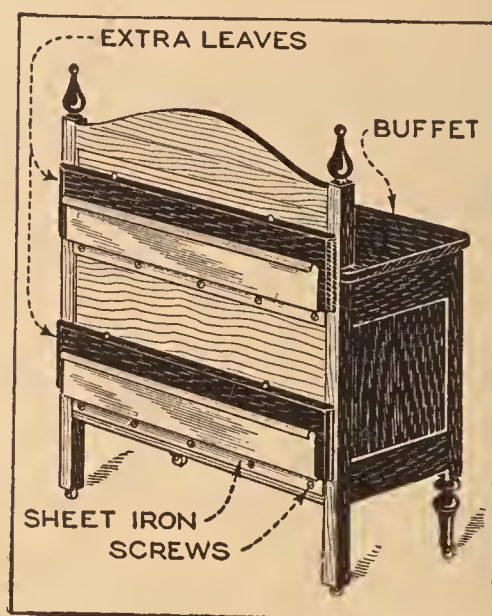
☐ Your radio questions, if sent to our Bureau of Information, will be answered by an expert.

Testing Lubrication of an Auto

A lubricating difficulty that shows itself by burning out the front connecting-rod bearings and scoring the cylinder of a light automobile, is caused by clogging of the oil-feed pipe that carries oil from the flywheel to the forward end of the crankcase. As a test, to determine whether the oil pipe is open, in cases where the engine shows symptoms of trouble from this cause, it is only necessary to remove the right-hand crankcase-cover screw and start the engine. A stream of oil issuing from the open screw hole will remove any doubt of the oil feed being clogged. If desired, this screw may be replaced by a small petcock which can be opened while the engine is running.

Storing Extra Table Leaves

It is sometimes quite a problem to the housewife to know where she can best store the extra leaves of the dining-

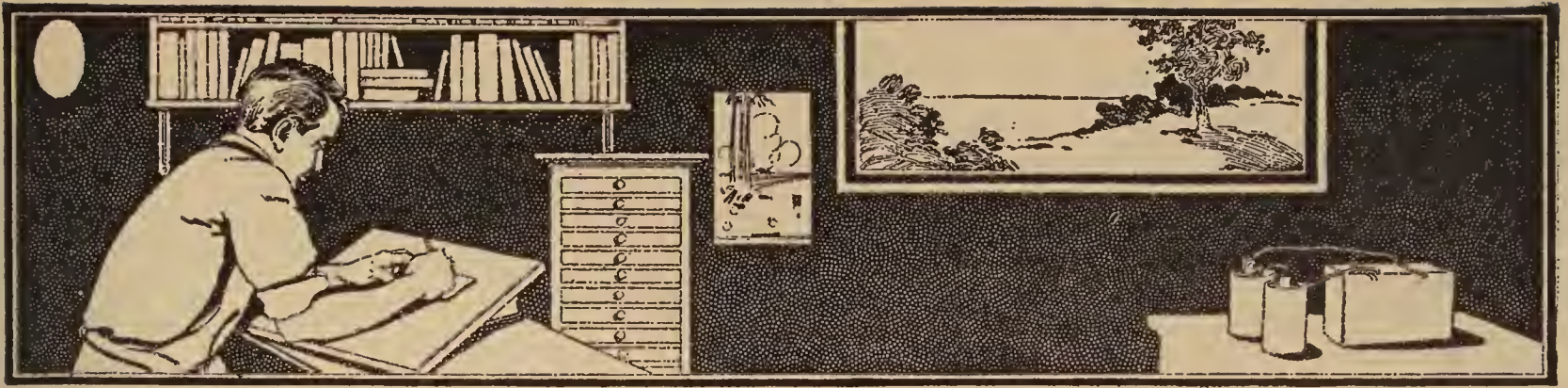


room extension table, so that they will be out of sight and at the same time readily accessible; the drawing shows how one housewife solved it. Pieces of sheet iron, about 6 in. wide, were

bent to the shape shown; holes were drilled along the lower edge for screws, and the upper edge was slightly curved outward to prevent scratching and marring the finish of the leaves. These brackets were then screwed to the back of the buffet. The leaves drop easily into place without moving the buffet; as the baseboard prevents it from coming close against the wall, there is generally plenty of room for the leaves.

Chain for the Clothes Closet

A piece of light chain, stretched taut between the walls of a clothes closet, is fine for holding coat hangers. The hooks of the hangers can be caught in the links so that there is no danger of their sagging together at one point, as they do when a cord, wire, or pole is used.



How to Make an Electric Hair Drier

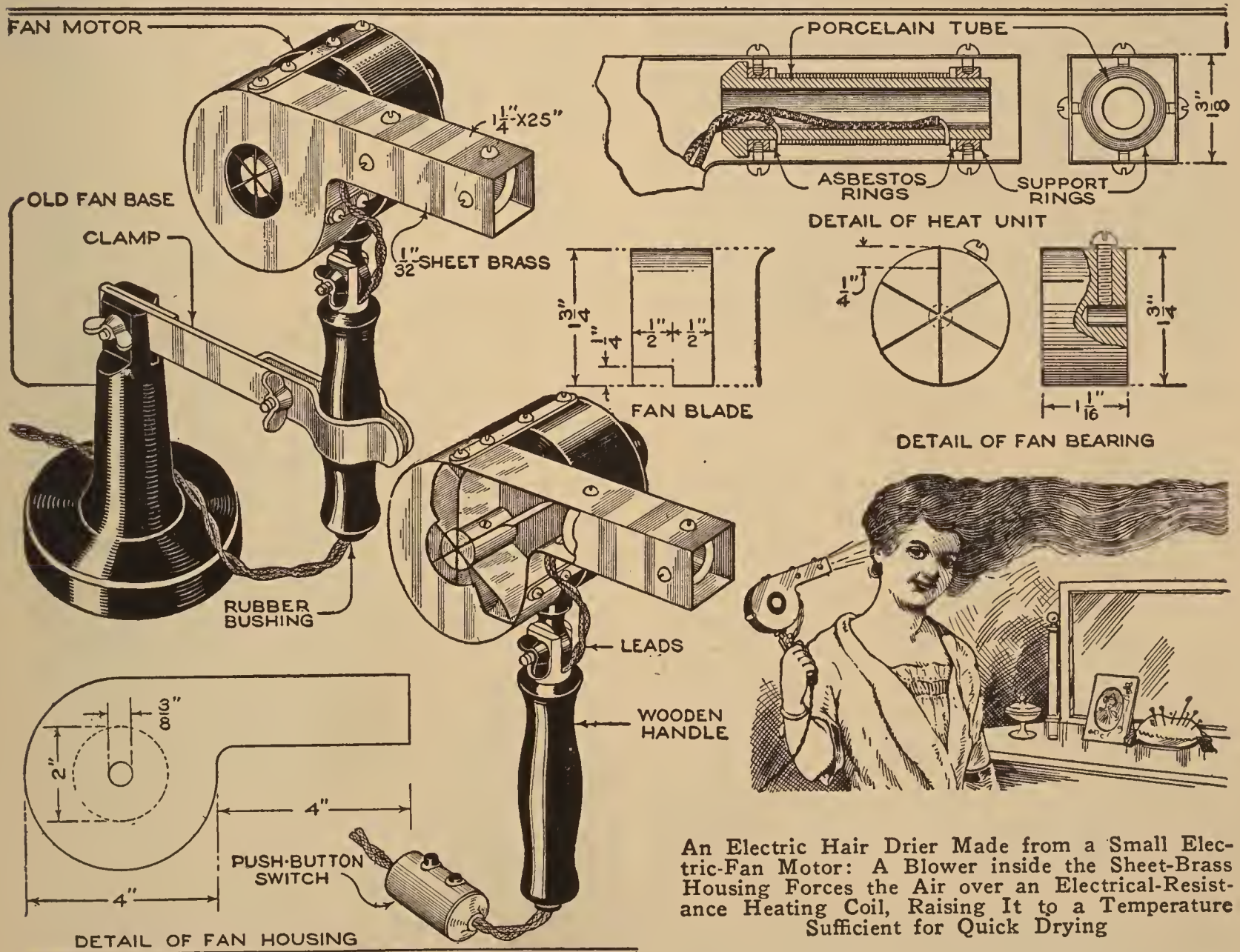
By A. H. SCOTT

THE only parts of the electric hair drier illustrated that require to be made, are the blower and heating unit over which the air is driven to raise it to a temperature high enough for speedy drying.

Two pieces of sheet brass, as illustrated, will be required for the sides of the fan housing, as well as a strip of the same

half their width, as shown, are sufficiently rigid to stand without additional support. The combination blower and heater is held to the electric motor by strips screwed to the blower and to the motor shell.

To make the heating unit, obtain a porcelain insulating tube such as used in ordinary house wiring, with an out-



An Electric Hair Drier Made from a Small Electric-Fan Motor: A Blower inside the Sheet-Brass Housing Forces the Air over an Electrical-Resistance Heating Coil, Raising It to a Temperature Sufficient for Quick Drying

material to form the top and bottom. The fan hub, or bearing, is made from a piece of round brass or iron, slotted across one end to accommodate the six brass blades. The blades are soldered into the slots, and, although supported for only

side diameter of 1 in. This tube is cut off 3 1/2 in. from the shoulder end, and used, as a core for 32 turns of .025-in. German-silver resistance wire. Wind the wire tightly so that there will be a space of 1/32 to 1/16 in. between turns, to prevent

short-circuiting. The ends of the first and last turns should be passed through $\frac{1}{8}$ -in. holes drilled through the tube. When drilling the tube, it should be plugged with wood and held in a vise, the jaws of which are protected with wood; an ordinary twist drill is used. The leads connecting the heating unit to the circuit must be asbestos-covered.

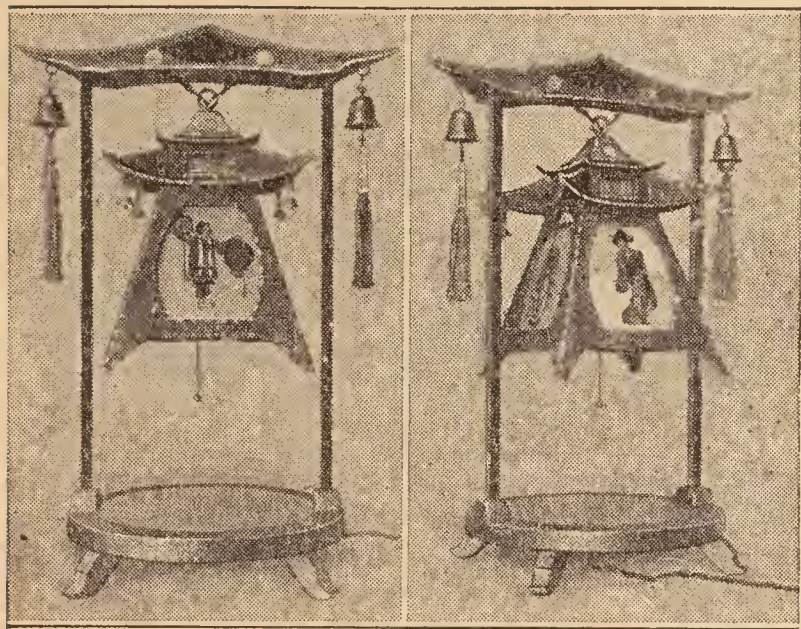
The heating unit should be centered out of contact with the blower housing. This is done with two brass rings, one at each end of the tube, cut from 1-in. brass pipe.

These rings should fit snugly over the ends of the porcelain tube and be insulated from the winding by asbestos washers. The rings are tapped at opposite sides to receive four machine screws.

When assembling the blower, care should be taken to avoid projecting screws that would catch the blades. The finished drier can be provided with a wooden handle, and this can be clamped to an iron base in the manner illustrated, so that it can be used either in the hand or upon a table.

A Japanese Table Lamp

The photograph shows a handsome Japanese-style table lamp, the principal parts of which, with the exception of the



A Neat and Attractive Table Lamp Made in Oriental Style: The Principal Parts are Made of Sheet Metal

base, are made of sheet metal. The panels in the lamp shade are painted, in Oriental style, on opal glass, using transparent colors. The entire frame is painted and covered with sand while the paint is still wet, and the edges are touched up lightly with gold. The shade is wired for an electric lamp, the wires being conducted through the tubular supports and underneath the base; this is made of wood, and is supported above the table on short feet. The completed work can be decorated with small bells and tassels, as in the picture, to increase the Oriental effect. —Louis Beegle, Los Angeles, Calif.

An Advertising Novelty

A novelty in window advertising, that will draw crowds, is very cheaply and easily made from a toy balloon.

The balloon, partly inflated, is fastened over an electric-light bulb in such a manner that air cannot escape at the point of

connection. A make-and-break socket, or some other means of opening and closing the circuit intermittently, is provided. When the current is turned on, the light transmitted through the thin rubber balloon will attract attention, and the heat from the bulb will cause the confined air to expand and distend the balloon. As soon as the circuit is opened and the light goes off, the air inside the sphere begins to contract and the balloon grows smaller. An advertising message can be painted on the balloon if desired.—Frederick C. Davis, St. Joseph, Mo.

Yoke Prevents Turkey from Straying

An Ohio farmer, whose turkey hen was continually wandering off with the young poults, devised the board yoke shown in the picture, which keeps the fowl from flying over or crawling through wire fences.

A board, about 6 in. wide and 18 in. long, of the lightest wood obtainable, was tied over the turkey's shoulders, an opening being cut in one edge of the board to conform to the outline of the back. The yoke was fastened to the bird by cords passing under the wings and across the breast.—C. M. Baker, Wooster, Ohio.



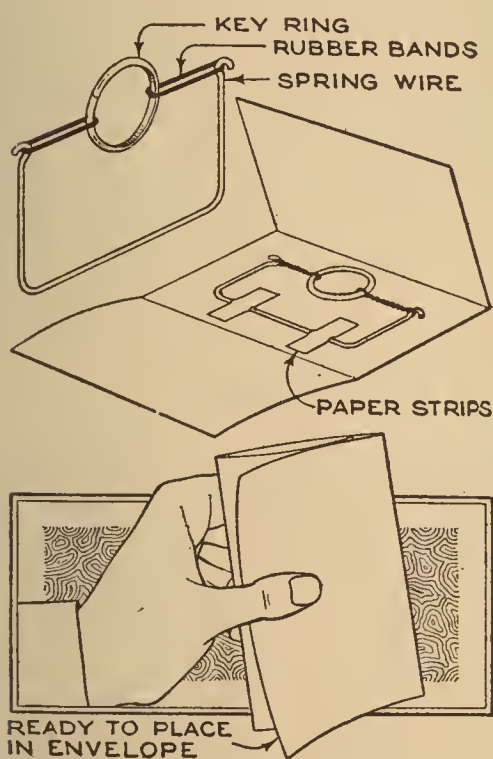
¶ A section of old inner tube, with one end cemented shut, makes a handy water pail for the motorist.

Antirattler for Windows

The flat-steel hair curlers that have taken the place of the familiar curling papers can be used to prevent a window from rattling. The curler is flattened out at the point where it is bent, and the resulting spring wedge is inserted between the window sash and frame.—Frank Jablcnik, Chicago, Ill.

A Trick "Letter"

Endless amusement will be obtained from the simple device illustrated, which



is attached to an ordinary sheet of letter paper, folded up and placed in an envelope. On opening the supposed "letter," the recipient gets something of a surprise when the ring revolves rapidly.

A U-shaped piece of spring wire is fastened to the paper by paper strips.

An iron washer, or ring of the type shown, is held across the open part of the "U" by rubber bands. In use, the rubber bands are twisted so that as soon as the letter is opened they begin to untwist and the ring to revolve, causing it to whiz and whir as though there were something very much alive in the letter.

Using Broken Drain Tile

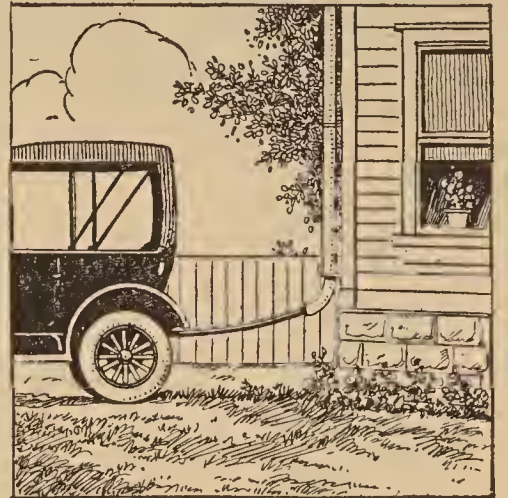
An outdoor stove can be made from a section of tile, for use in cooking feed, heating water, melting tar, and similar operations. A sheet-iron top, with a hole cut in it to accommodate a length of stovepipe, is provided to support the vessels. An opening in the form of an inverted "U" is chipped in the tile, at a point near the bottom edge, for the insertion of fuel.

The breakage of a small section from the flange of large-diameter sewer tiles makes them unsuitable for use in drainage systems, and they can easily be obtained by anyone wishing to use them.

Exhaust Cleans Down Spout

It happens frequently that birds' nests, leaves, and other débris collect in the eaves troughs and wash down into the conductor pipe. During a heavy rain the pipe may be so thoroughly clogged that a free flow of water to the cistern or drain is impossible.

As such obstructions are generally not accessible without a great deal of difficulty, the exhaust from an automobile

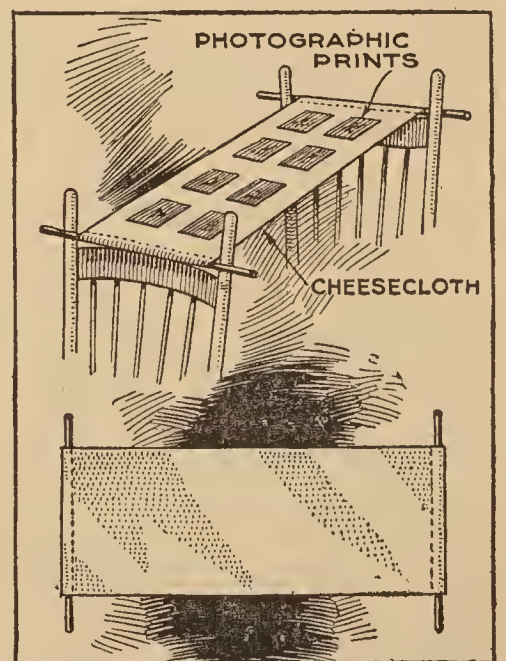


engine can be used, with good results, to blow out the accumulated débris. The drawing shows how this is accomplished by connecting the rain spout to the exhaust pipe of the car with a piece of hose. By racing the engine, there will be sufficient pressure to eject all ordinary obstructions through the eaves-trough opening.—G. E. Hendrickson, Argyle, Wis.

A Print-Drying Stretcher

The commonest method of drying prints consists in the use of a cloth-covered

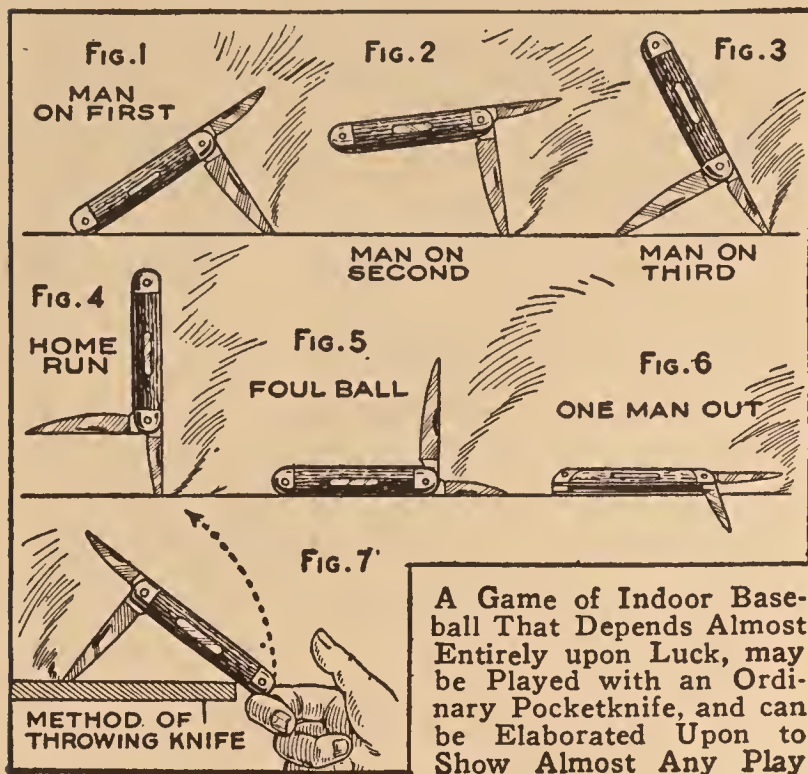
stretcher on which the prints are placed face downward; as cheesecloth is used, there is more or less circulation of air on both sides of the print, which consequently dries very quickly and without the tendency to curl. As gen-



erally built, wooden frames are made and covered with cheesecloth, but these occupy considerable room. However, if a strip of cloth, of the length desired, is hemmed at the ends and pieces of broom handle inserted, as indicated in the drawing, the stretcher can be supported between two chairs, and rolled up into a compact bundle when not in use.—Harry G. Schultz, Teaneck, N. J.

Indoor Baseball with a Penknife

A game of indoor baseball that depends for results more on pure luck than on skill, can be played with an ordinary



pocketknife having two blades that can be opened at right angles to each other.

The game is played on a board, or on an old table. Fig. 1 shows the position of the knife that gives the player a man on first base; when the handle is not touching the surface, as in Fig. 2, the player is on second, while to have a man on third, the weight of the knife must be resting on both blades, as in Fig. 3. A home run is scored for the player when the knife stands vertically as in Fig. 4, and the positions of the knife for a foul and a man out are shown in Figs. 6 and 7.

In playing the game, the knife is rested on the surface of the table in the manner shown in Fig. 7 and given a quick upward flip with the hand. Various other plays may be improvised with little trouble by the baseball devotee, so that the game can be made really elaborate.—W. S. Morton, Pasadena, Calif.

Incubator Used as Oats Sprouter

The value of sprouted oats as a green food for poultry has long been recognized, but the difficulty of obtaining or constructing an efficient sprouter has prevented many spare-time poultrymen from making use of the knowledge.

Any poultryman who owns an incubator that is not working during the winter months has at his command an efficient device for sprouting oats. The drawers are removed and extra strips are temporarily tacked to the sides of the

incubator, on which the trays containing the oats are placed. The trays are single wooden frames covered on one side with screen wire or burlap. About an inch of space is allowed between each tray to permit a free circulation of warm air.

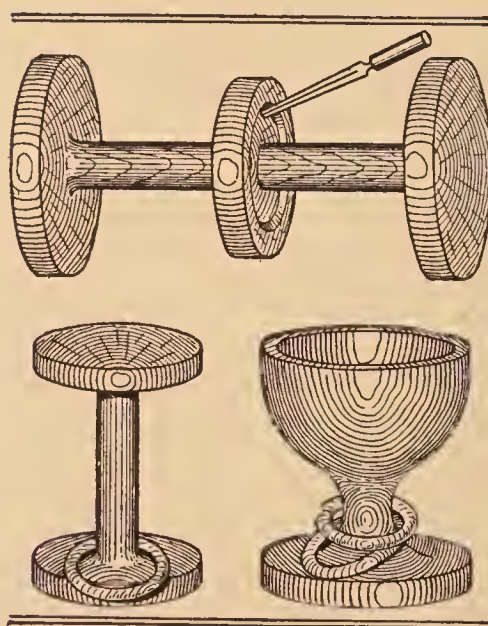
The oats are moistened and placed in the trays and the incubator lamp is lighted and adjusted to maintain a temperature of about 75° F. To prevent the oats from drying out, pans of water should be placed on the floor of the incubator and the grain sprinkled each day.

If the various trays are filled at intervals of a day or so, the poultryman will have a constant supply of green food for his flock.

In placing the additional strips that are necessary for supporting the trays, very small brads or nails should be used, as there will be very little weight upon the strips, and their removal will not then be so likely to mar the appearance of the incubator.

Novelty Wood Turning

Specimens of wood turning containing rings that cannot be removed because they are smaller than the ends of the article to which they are attached, are turned out quite easily on the wood-turn-



ing lathe, the illustrations showing two examples of this class of work.

The first operation is to turn the work to the desired shape, as shown, leaving a disk on the spindle. Next, sand and polish the disk as

though it were to remain there, and when this is done the ring can be cut from the disk in the manner illustrated. This is best done with a sharp-pointed tool, held at about the angle indicated in the drawing, cutting very slowly. When the ring is loose, the lathe must be stopped and the inner side smoothed with a file. The ring can be tied to the spindle where it will be out of the way, and one or more smaller rings can be turned off in the same manner, if so desired, or the remainder of the disk turned off flush with the spindle.—Victor Carl, Steubenville, Ohio.



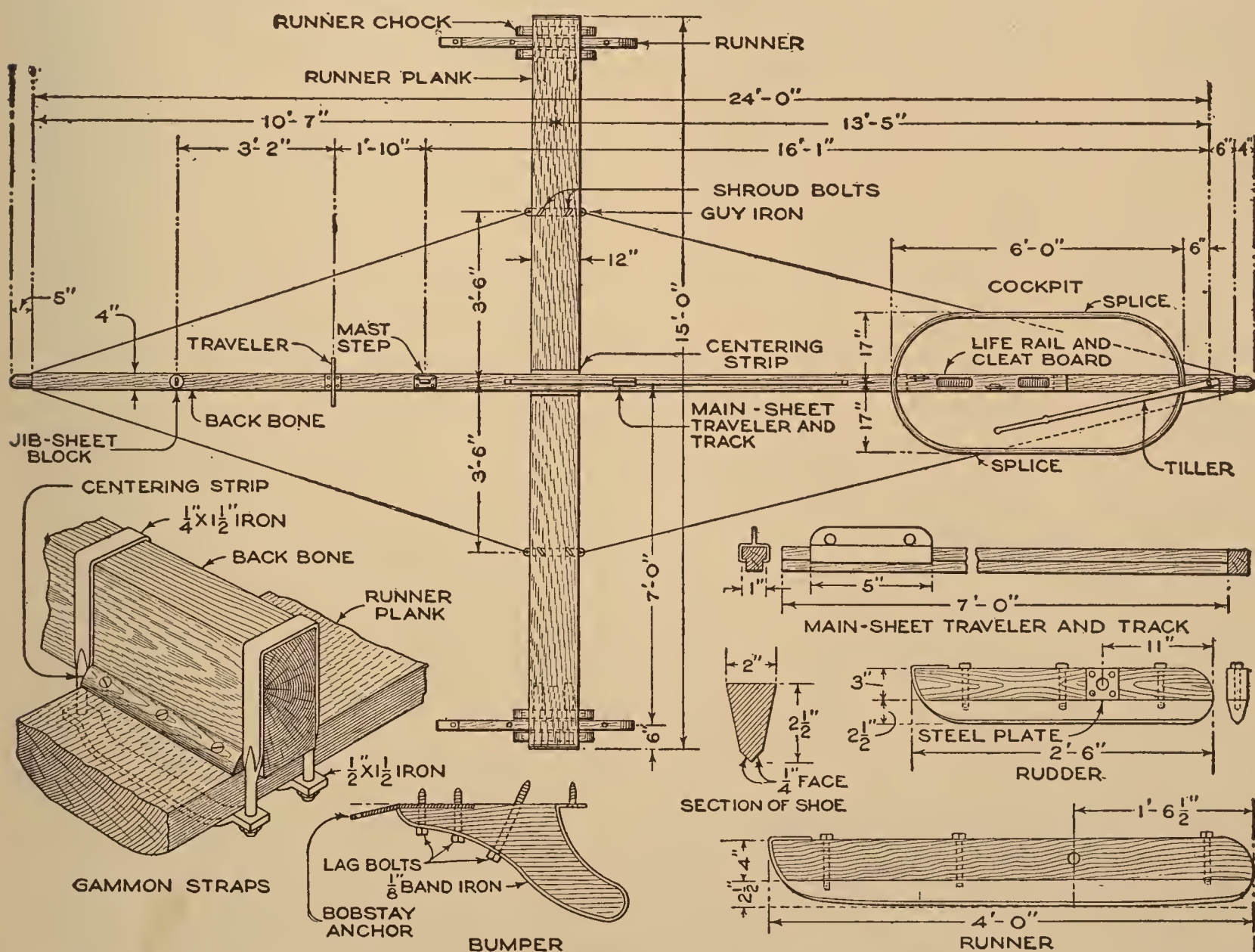
Part I—Hull Construction

ALTHOUGH the northern part of this country is blessed with innumerable lakes and streams, where that king of winter sports, ice yachting, should be enjoyed, comparatively little definite is known of the construction of fast, easily handled craft, except around such ice-yachting centers as the Hudson and Shrewsbury rivers, Orange Lake, and some mid-western lakes.

From the number of crude makeshift affairs so often seen, it is obvious that

that this article is written. The yacht herein described, while not too large to be used on a good-sized pond or small lake, is of sufficient size and speed for the most exciting races, being at the same time perfectly safe and easily handled, provided the given measurements are strictly adhered to.

The material used in the construction depends to a great extent on the available supply. In purchasing the lumber, one should always buy the driest obtainable,



Full Details of the Backbone, Runner Plank, and Runners: Note the Curve on the Edge of the Runner, and the Position of the Splices on the Cockpit

many real yachts would be built, to the lasting delight of the owners and their friends, if their design and construction were better understood, and it is for the purpose of providing this information

and the better the quality the handsomer will be the completed boat. There is no reason why one who can use carpenters' tools with ordinary skill should not be able to turn out a first-class job at a

moderate outlay, if the instructions are closely followed.

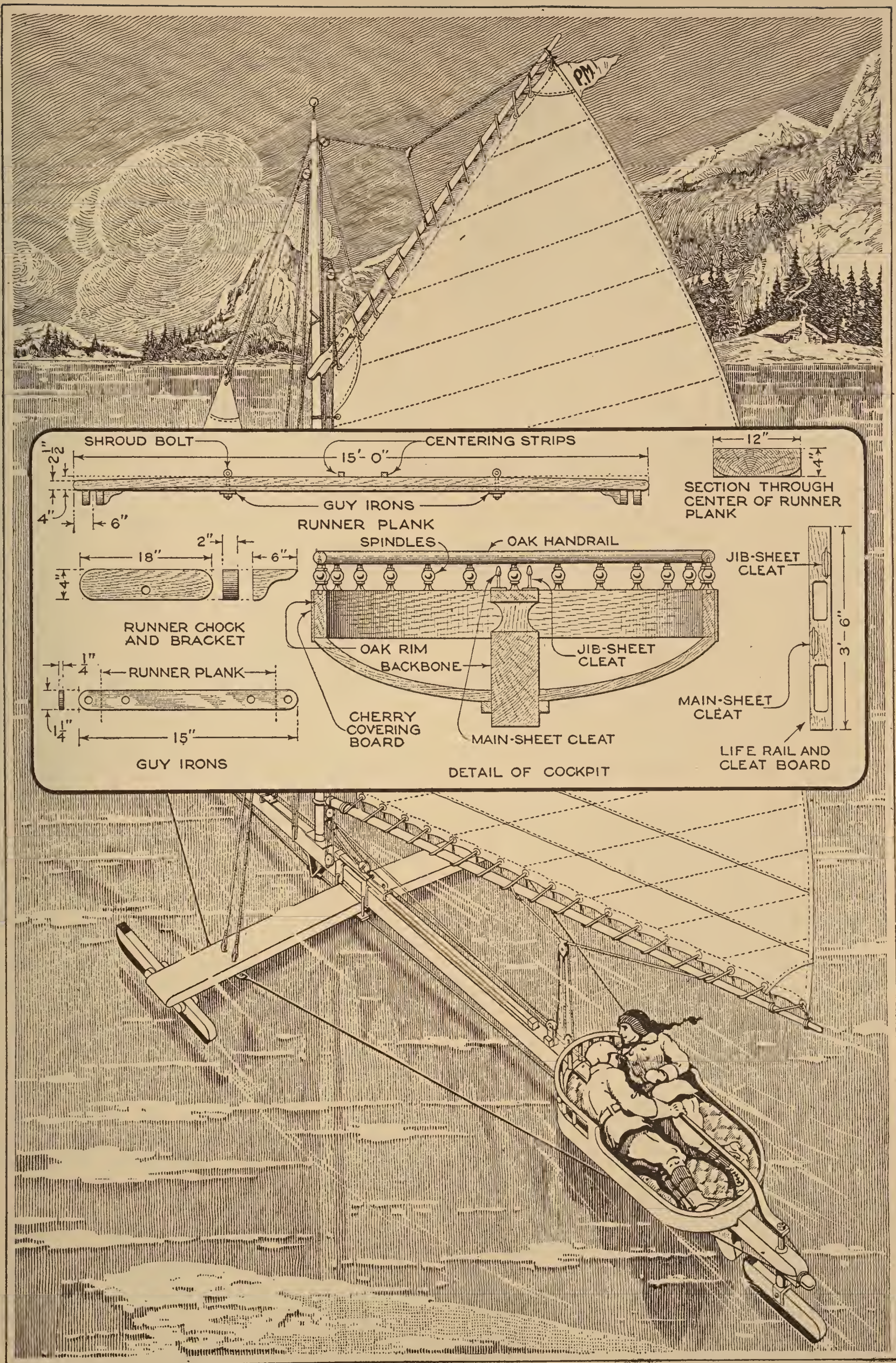
For the backbone, butternut, white pine, and basswood are the most suitable woods, although cypress may also be used. The tendency of spruce to "wind" eliminates that wood from all consideration. As it is hardly possible to obtain one stick long enough for this part, allowance must be made for a splice of not less than 8 ft., and longer than this if possible. This splice should be made with one long, straight cut, without notches of any sort, as the notches weaken the timber. Only the best grade of pot glue should be used, and the joint thoroughly fastened with $\frac{1}{2}$ -in. lag bolts, put in from the bottom, with large washers under the heads. When spliced, the stick should measure 4 by 8 in. by $25\frac{1}{4}$ ft. It is left straight on the underside throughout its entire length and of full width, but the top of the bowsprit is tapered in a curve, beginning at the mast, down to the shoulder where the eyebolt for the forestay goes through; here it is made 4 in. thick, and from a point 2 ft. aft of the runner plank another curved taper should run to the stern shoulder, where it is 6 in. thick. All four corners on the bowsprit are rounded, and after the cockpit is in position, the after part of the backbone should be slightly rounded all the way to the stern. The tip of the bowsprit is rounded for a distance of 5 in., to receive the guys and bobstay, and the stern for a distance of 4 in., as shown in the deck plan. To insure an accurate rudderpost hole, it is bored halfway through from the top, and finished from the bottom. The whole backbone should then be planed smooth, and finished with cabinet scraper, sandpaper, and generous quantities of elbow grease, then soused with boiled oil. This applies to every part made of wood, as the oil prevents it from turning black should the varnish be marred.

The cockpit is the only really difficult part of the whole boat to make, as the rims are made of cherry and oak, and require steaming and bending over a form, with two splices where shown. The oak rim is 4 in. wide by 1 in. thick, is finished smooth, and, after forming and splicing, is placed in position and accurately centered on the backbone. Marks are made on the under edge of the rim to correspond with the edges of the backbone, and notches, $\frac{1}{2}$ in. deep and as wide as the backbone, are cut in the rim; these notches fit over the backbone, to which the cockpit is securely fastened by two

large screws at each end; a heavy iron strap, bent in the shape of an "L," is screwed to both the backbone and the inside of the cockpit rim at each end.

The bottom can either be made of $\frac{1}{2}$ -in. whitewood, in one piece, or of oak strips, 1 in. wide, with $\frac{1}{4}$ -in. spaces left between them. Strips are better, as the spaces permit snow and water to pass through so that no ice can form. The bottom is screwed to the underside of the oak rim, shaped to the form shown, and reinforced by three strips of flat iron. The cherry covering board extends just below the joint of the bottom and rim, is spliced on the side opposite to the splice in the oak, and thoroughly screwed to the rim. All screw heads are sunk in deeply and wood-plugged. The handrail is of oak, on apple or maple spindles, and the life rail and cleat board are of 1-in. oak, the same width as the backbone, with the forward end screwed to the cockpit rim and the after end raised level on an oak block.

Butternut, white pine, basswood, and ash are the most suitable woods from which to make the runner plank, although cypress has also given excellent satisfaction. If ash is used, the finished plank should be $\frac{1}{2}$ in. thinner than the softer woods. The rough plank should measure 16 ft. long by a full 4 by 12-in. section. As in the backbone, the underside is planed perfectly straight; the center is then marked with pencil, and from this all measurements are taken. A thickness of $2\frac{1}{2}$ in., measured from the under edge, is marked at each end; a long, thin batten is sprung from these marks to the top edge at the center, and a line drawn to mark the curve to which the plank is finished. The four runner chocks and four brackets are made in pairs from 2-in. oak, or maple, of best quality. Lay off and mark the position of the inner starboard (right-hand, looking forward) chock, referring to the deck plan; square the chock very accurately, and bolt with four $\frac{1}{2}$ -in. carriage bolts, after sinking the chock into the runner plank $\frac{1}{4}$ in. This prevents the runners from becoming twisted out of true, and applies to all four chocks, as no other part of the boat is subject to such a terrific strain. All bolts should have washers under the head as well as under the nut. Using very large screws, one pair of brackets is fastened to the chock, then to the plank. Assuming that the runners are finished, mark one with an "S," indicating that it is always to be used on the starboard side. Place it in position with built-up cardboard, 1 in. thick, between it and the



The General Construction of an All-Around Ice Yacht of the Hudson-River Type is Shown in This Illustration. If Made According to the Instructions Given, This Yacht will Prove Not Only Fast Enough for Racing, but Very Easily Handled and Safe

chock; put the outer chock in position, then put the runner bolt through all three, tightening the nut with the fingers. This will give the position in which the outer chock is to be bolted, with sufficient allowance of space to insure free play for the runner. Cut an "A" with a chisel on the rear edge of the plank at the center, corresponding with the heel of the runner, indicating that this is the after edge. Mark the position of the inner chock on the port (left-hand) side, and bolt with one bolt only, without sinking the chock into the plank, and place the runner, cardboard, and the outer chock in place, as on the starboard side. Cut a 2-in. notch in the edge of a board equal in length to the runner plank, place it over the heel of the starboard runner, and make a slight mark where it rests on the heel of the port runner. Shift the plank to the forward end of the runners, to find if the running edges are parallel. Repeat this, shifting the port runner and chock until the running edges prove absolutely parallel, for upon their accuracy, more than on any other one thing, depends the sailing qualities of the boat. Sink in and secure the remaining chocks and brackets permanently, and remove the cardboard strips. Saw off and round the ends of the plank, as shown, and from a point opposite the inner ends of the chock brackets, spring another curve parallel with the top of the plank, and chamfer off the under edge, giving the plank a curved appearance. Strips of quarter-round hardwood are then screwed across the center in such a position that the backbone will always rest across the center of the plank.

Cast iron of the best grade is the only material which may be used for runner shoes of an ice yacht, therefore a wooden pattern of the exact size and shape of the finished shoe must be made, from which to have the shoes cast, and one for the rudder also. Although the drawings show the runners in detail, a description of the shoe is necessary. The running edge is a true right angle, and must be kept so in order to get the utmost speed out of the boat; the faces of the right angle are $\frac{1}{4}$ in. wide. The upper face must be trued in a planing machine and then drilled and tapped for capscrews. As a majority of foundries have a machine shop in connection with them, this should not be an expensive piece of work. The oak or maple top must be perfectly fitted and bedded to the shoe, and the joint made with white lead. The capscrews are $\frac{3}{8}$ in., with washers under the

heads, and are drawn up very tight. The bolt just aft of the runner-bolt hole is countersunk to clear the runner plank. The runners must be filed with the greatest possible accuracy by the following method: Place one in the vise, and, using a wooden straightedge as a guide, file the running edge to a perfect curve, with the point beneath the bolt hole left untouched and the toe and heel filed down $\frac{3}{16}$ in. The straightedge should rock back and forth smoothly. File the faces back to a sharp right angle and finish with a carborundum stone. The runner-bolt holes are bushed with brass pipe of sufficient diameter to take a $\frac{1}{2}$ -in. bolt freely. These bolts have square heads, sunk into the chock $\frac{1}{4}$ in. to prevent turning, and are 8 in. long, with cotter pins outside the washers and nuts. A box, or crate, to hold and protect the runners when not in use, should be made, as any slight damage to the running edge may mean a long job of filing. In use, the runners should always remain on the ice overnight, to prevent rusting, and the edges kept in perfect and sharp condition for racing.

A hardwood bumper, made from 2-in. stuff and bound with flat iron, screwed on, is placed just forward of the rudder. It will be necessary to take measurements for this part with the rudder in position. The bobstay anchor is of $\frac{1}{4}$ by $1\frac{1}{4}$ -in. flat iron, with holes drilled for lagscrews and for attaching a turnbuckle.

The track for the main-sheet traveler is made of any close-grained hardwood, in two pieces, screwed to the backbone, as shown, with the forward part removable, to allow the gammon straps to be placed in position. It should be well oiled, and only the top varnished. If it is varnished all over, the traveler will stick. The traveler must be made of brass or bronze.

As soon as the oil is thoroughly dried, go over the whole lightly with fine sandpaper and apply two or three coats of the best spar varnish obtainable, rubbing lightly between coats. All metal work not of brass should be painted with aluminum paint. This completes the hull woodwork.

A Cheap Floor Wax

A cheap wax for ballroom floors may be made by shaving 4 oz. each of paraffin and spermaceti wax, and mixing thoroughly with 8 oz. of talcum powder. The waxes should be shaved as finely as possible, mixed with the talcum, and passed through a fine sieve.

Trimming Wet Prints

To trim wet photographic prints without pulling or tearing the edges, thoroughly wet a piece of common wrapping paper, and spread it evenly and smoothly over the surface of a piece of glass as large as the print. Lay the print on the wet wrapping paper, and, using a brass-edged ruler and a sharp knife, trim the print as desired.

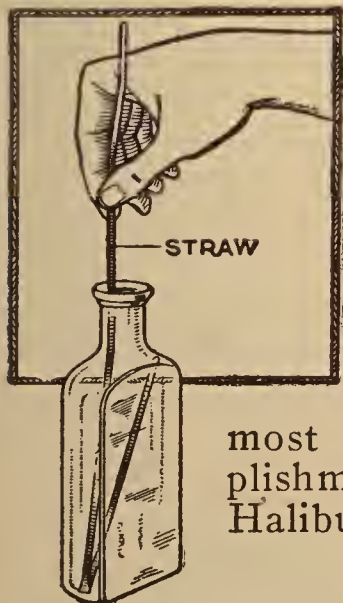
Film Spools Make Good Candlesticks

Excellent stands for the camper's candles can be made from the metal flanges taken from the ends of film spools, as shown in the drawing. Small candles simply can be pushed inside the central opening in the metal flange, but as the average candle is a little larger in diameter than this opening, it will be necessary, in most cases, to insert the flange into the bottom end of the candle, as shown in the right-hand figure; this can easily be accomplished if the metal, or the end of the candle, is slightly warmed. The additional base area thus obtained makes it possible to set the candle down on almost any level surface without danger of its falling over.



Lifting a Bottle with a Straw

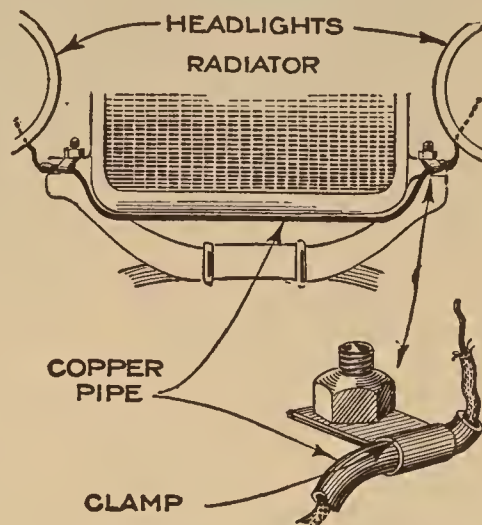
An amusing trick for those who delight to mystify their friends is to challenge them to lift a bottle with a straw. As the illustration shows, it is absurdly simple when one knows how, the straw being bent, and one end caught under the shoulder of the bottle; but to those not in the secret, it will seem almost impossible of accomplishment. — J. McCormack, Haliburton, Ont.



☛ The dried silk of milkweed seedpods can be used as filling material for cushions and pillows.

Protecting Headlight Wires

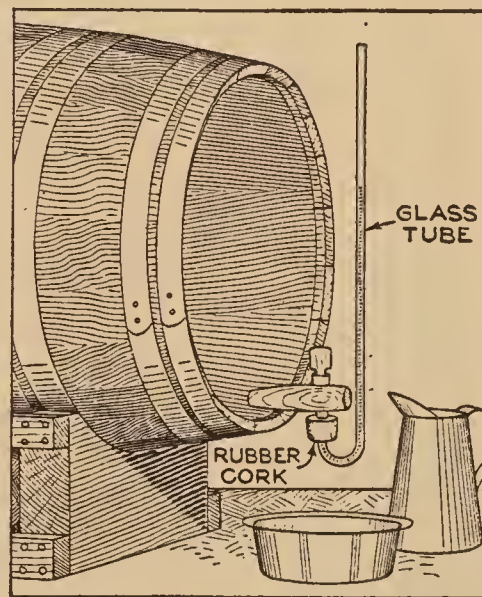
The wire that connects the headlamps of a light automobile is frequently placed loosely under the engine hood, or in a tube soldered to the back of the radiator. With either arrangement the edges of the hood, in closing, will sometimes short-circuit the wires, burning out the bulbs and leaving the driver in darkness, usually at an inconvenient time.



A method that is dependable and not subject to the trouble mentioned, consists in running the wire through a suitable length of copper tubing outside the radiator, fastening it to the car with clamps on the radiator staybolts. Thus arranged, the wires are removed from all possible contact with the edge of the hood or with moving parts of the engine.

Measuring Liquid in a Barrel

The drawing shows a simple apparatus for gauging the liquid contents of a barrel or similar container. It is made from a piece of glass tubing and a large-sized rubber cork. The lower end of the tube is bent into the form of a "U," by heating the portion to be bent in a gas or alcohol flame, bending the glass when it has reached a red heat. Both ends of the tube are open, and the cork is fitted over the short end and over the spigot as illustrated. With the gauge in position, the spigot is turned on and the depth of the fluid in the barrel is indicated by its height in the tube. This makes a very handy device for keeping tab on a liquid which is being drawn off at intervals, and especially where the amount of headroom over the barrel is limited. — D. Tenney, New York, N. Y.





Part II—Spars, Rigging, and Assembling

ONLY the best grade of spruce is suitable for spars. Unquestionably hollow ones are lighter and stronger, but they cost a lot more. If expense is no objection, buy hollow spars, otherwise proceed as follows: For the mast select the clearest 4 by 4-in. stick to be found; for the boom and gaff a 3 by 3-in. stick, and for the jib boom, a 2 by 2-in. piece. Plane the stick for the mast fairly smooth on all four sides, then lay off a taper from a point 6 ft. from the foot, reducing the diameter to 3 in. at the heel. Plane all four sides, still keeping the stick square. From a point 5 ft. from the masthead, taper to 2½ in. Plane off all four corners, making an octagonal stick; then, with a small plane, round the spar, and finish with enough sandpaper and elbow grease—especially the elbow grease—to remove all plane marks. If any attempt is made to round the spar before tapering, it will be found impossible to keep it straight. A brass or iron ferrule, 2 in. wide, is fitted to the foot to prevent splitting, and a mortise cut to receive the mast step. Shroud cleats of apple wood or maple, of the form shown, are screwed at the points indicated, and the throat-halyard bracket and eyebolts put in place. The boom and gaff are identical in construction with the mast. The boom tapers to 2 in. at either end, with a large hole through the after end for the sail haul-out. The gaff tapers to 1½ in. at each end, with a haul-out hole at the peak, and oak jaws, fitted with a throat block, riveted at the throat. It is best to buy the jaws from a ship chandler. The jib boom is not tapered, but is rounded, and the jaws of the jib-boom shackle are riveted in place. The bridle cleats for the boom and gaff are similar to the shroud cleats, but smaller.

Wherever possible, brass or bronze should be used for fittings, although iron will do. The detail drawings show the masthead fly, throat-halyard bracket, and the two guy irons so plainly that no description is needed. The jib traveler is of ¾-in. rod, riveted and brazed to a ¼-in. plate. Ten-penny nails make excellent

cross pins for the traveler; the object of these is to prevent the sheet block from slipping around to the underside of the traveler. The two members of the mast step are also riveted and brazed. The dolphin striker is of ¼ by 1-in. stock, with a half section of pipe brazed in the lower end of the "V." The jib-boom shackle is all brass, with the end hole threaded to fit the forestay turnbuckle. The gammon-strap set cannot be made until the backbone and runner-plank parts are in place. It will probably be found advisable to cut strong paper patterns of the gammon straps for the blacksmith or machinist to work from. The bolts on the straps are riveted and brazed to the flat iron. Unless cast of bronze and turned, the rudderpost must be forged by a first-class blacksmith, it being a somewhat difficult piece of work. It is fitted with a soft-rubber bumper, which greatly relieves the shock of sailing over rough ice. Of course, the tiller must be fitted to the post so that there is no lost motion. The handle is wound with cotton cord, filled with shellac, and varnished. Plates may be used in place of the rudderpost bushings, but will soon wear, and will, in turn, wear a groove in the post, so that bronze or cast-iron bushings, of the form shown, are well worth the extra expense, as they will last forever.

As there are a number of first-class sailmakers who specialize on ice-yacht sails, one of them should be selected, and the sail plan sent to him when placing the order. Yacht twill will make strong, durable sails at a low price, but the better grades of sailcloth are more satisfactory. In giving the order, the fact that the sails are for an ice yacht should be mentioned, together with the following specifications: jib to have snap hooks for forestay, and be made to lace to the boom, or the foot will be cut as for a sailing yacht. Main-sail to have thimbles in pairs on hoist for mast-hoop lacing, and single thimbles on foot. Otherwise leave it to the sailmaker. He knows.

The cockpit cushions are made of good-quality ticking, covered with corduroy or

plush on the edges and one side only, and filled with upholsterer's moss, or the contents of a discarded hair mattress; $2\frac{1}{2}$ in. is sufficient thickness. In length, the covering should be 6 in. longer than the cockpit, as proper filling shortens the cushion considerably, and if made long, the finished cushions will fit tightly enough to stay in place. The buttons for tacking should be covered with the same material as the cushion.

The shrouds, forestay, and guys are made of $\frac{1}{4}$ -in. iron wire, and the bobstay of $\frac{3}{8}$ -in. wire. In making up each piece, the measurements must be taken from the boat itself to avoid mistakes. Loops to fit the masthead, and the ends of the backbone, are first spliced; then the opposite ends are spliced into $\frac{3}{8}$ -in. galvanized shackle-and-shackle pipe turnbuckles of the slot and cotter-pin pattern. (Never use any hook turnbuckles.) All turnbuckles should be fitted with wire-rope thimbles, and all loops and splices tightly served with hard cable-laid cotton cord about $\frac{1}{8}$ in. in diameter, filled with shellac, and varnished. The bobstay has an eye splice formed to fit the backbone nose; from there it runs down under the dolphin striker and aft to the anchor iron screwed to the bumper. The bridles for the boom and gaff are $\frac{1}{4}$ -in. wire, with loops finished as above. The halyards should be crucible cast steel, $\frac{3}{16}$ in. in diameter, finished as follows: The jib halyard is spliced in a pair of match hooks with wire-rope thimble for attaching to the jib, and the lower end spliced around a lignum-vitæ deadeye. The upper end of the peak halyard is spliced into a self-locking brass bridle fitted with a thimble, and the lower end around a thimble to receive the purchase block. The throat halyard has a thimble in each end, one for attaching to the eyebolt at the jaws of the gaff, and one for a purchase block at the lower end. The splices are finished in the same manner as for the shrouds and stays. All Manila rope is $\frac{3}{8}$ -in., spliced in, with free ends moused with sail thread. The main sheet proper is spliced into the becket of the bridle block at one end, and around a thimble at the other, for attaching to the main-sheet traveler by a screw shackle. This traveler is hauled along the track by a purchase attached to the foot of the mast, giving ample power to trim sail easily during a race, without luffing and losing speed. The remaining ropes are so plainly shown in the illustration as to require no further description.

The halyard blocks are of the type de-

signed for wire rope only, all others being any first-class make of bronze yacht block, with fittings suited to the work for which each block is used. Galvanized blocks will not do, nor should any have hook fittings.

Together with the rigging described above, eyebolts, mast hoops, gooseneck, cleats, lacing, and screw fair-lead-ers must be purchased from the ship chandler. The jib and mainsail lacing is $\frac{3}{16}$ -in. braided cotton, and the same material is used for the sail haul-outs. Fair-lead-ers are screwed into the top of the main boom, alternating with the thimbles on the foot of the sail, and through all is run a Manila stop, drawn very tight. Two fair-lead-ers are also used in the runner plank on each side of the backbone, for lashing the halyard-purchase ropes.

The whole boat, including the sails, but not the runners, should be set up complete outside the shop to prove that every part fits properly before putting it on the ice.

Always, when setting up, the gammon straps are first bolted tight, then the runner plank and backbone squared by measuring from the center of the rudder-post hole to a certain point on corresponding chocks at opposite ends of the plank, tightening the guys accordingly.

A combined sail and cockpit cover, preferably of waterproof duck and extending the full length of the boat, is necessary for protection from the elements. It should be made in one piece, with an opening to go around the mast, and have grommets along each edge for ties to bind it down tightly to the guys and bobstay. A horse set under the boom will hold the cover up, tent-fashion. Colors for a craft of this size should be 18 by 12 in. During snow, the runners should be removed, dried, greased, and carefully put away in their box.

In many things one finds that the pleasure of anticipation and preparation far exceeds the actuality; this, however, does not apply at all to ice-yachting. For while the construction of such a craft will give the builder many happy hours' employment, the sailing of it will prove the greatest imaginable joy after the tricks of the trade are mastered, and the only way properly to master them is racing with some old hand at the game. When that incurable disease, "ice-yachting fever," attacks one's blood, the only relief is ice-yachting. While the building hardly comes under the head of woman's work, the sailing surely may be termed woman's sport as much as is running a motor car.

Transferring Prints to Glass

It is sometimes desirable to transfer photographic prints to glass, or to some other solid substance that may or may not be transparent, to obtain some particular decorative effect.

The surface of the glass, or other substance, is first coated with a half-and-half mixture of turpentine and Canada balsam, or, if obtainable, dammar varnish. The glass is set aside until the varnish has become quite "tacky;" the time required for this will vary with the dryness of the atmosphere. The print to be transferred is soaked in water until limp, and the surplus water is removed by pressing it between sheets of lintless blotter. The print is then carefully laid on the prepared surface, another blotter being used to press it into place and also to prevent the possibility of water or air bubbles being confined underneath the paper. When this is completed, the whole work is set aside until it becomes thoroughly dry, which will require from one to two days.

The next operation is the removal of the paper backing, so that only the film containing the picture will be attached to the base. The paper is removed by wetting the fingers and rubbing it off in small rolls, and it will be found, after a little practice, that this is not at all difficult.

If developing-out paper is used, a little more work will be required, as the paper stock is heavier than that ordinarily used for printing-out papers. When the paper has all been removed, the appearance and transparency of the finished work are improved by an application of transparent varnish. The same process can be applied to the decoration of opaque surfaces. However, in the latter case, the picture will be reversed, as the print is applied to the surface face down.—A. C. Cole, Chicago, Ill.

Soap Dish as a Motor-Car Fitting

A nickelplated soap dish, a familiar fitting in every bathroom, can be made to serve another useful purpose when mounted on the dash of an automobile, in front of the driver. Such a receptacle makes a convenient place for carrying matches and similar small articles.

Storm Windows Made from Shutters

A snug-fitting and easily opened storm window can be made by replacing with



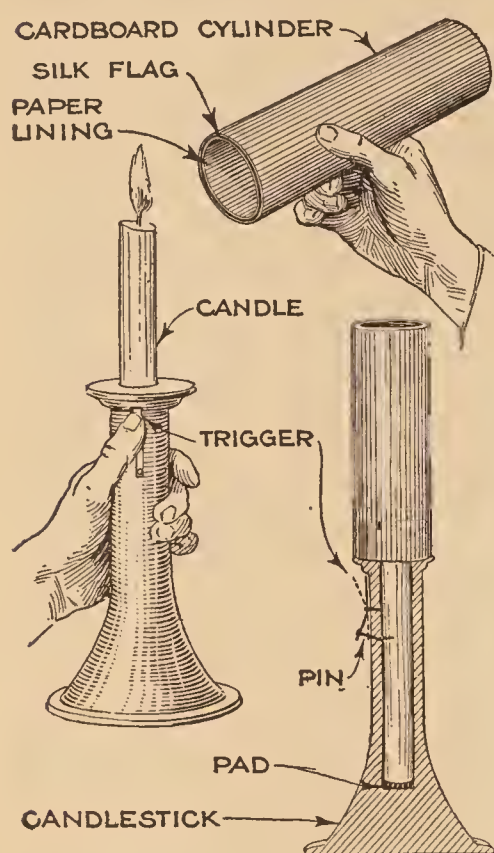
Outside Shutters Converted into Neat and Substantial Storm Windows by Merely Removing the Slats and Substituting Glass Panes: Even the Old Slats can be Used to Further Advantage for the Protection of Tender Plants, as Shown at the Left

glass the slats in the outside shutters of those rooms that are difficult to keep at a comfortable temperature in the winter. The slats can easily be removed and the glass panes that take their place are held by strips of light molding. The principal advantage of using the shutters as storm windows, aside from the ability to open them easily on mild days, is that they are already cut to fit and the hardware is already in place.

Even the old slats can be used to further advantage, as shown in one of the illustrations, by using them to support sheets of glass for the protection of early spring plants. Notches are cut into the slats at each end, and these serve to hold old photographic negatives in the manner illustrated in the lower photograph.—Walter C. Harris, Brooklyn, N. Y.

The Magic Candle and Flag

This is a trick that can easily be performed by the amateur with very mystifying effect, and the necessary apparatus is simple to make. The trick is this: A candlestick, with a candle in it, is placed on a table; a cylinder is shown to be empty, after which it is placed over the candle so that the latter is concealed; the "magician" makes a few appropriate passes, at the same time saying one of the seven magic words, of which "abracadabra" is the most "potent"; when the cylinder is removed, the candle will have disappeared, and the tube is still shown to be empty. Then a flag or handkerchief

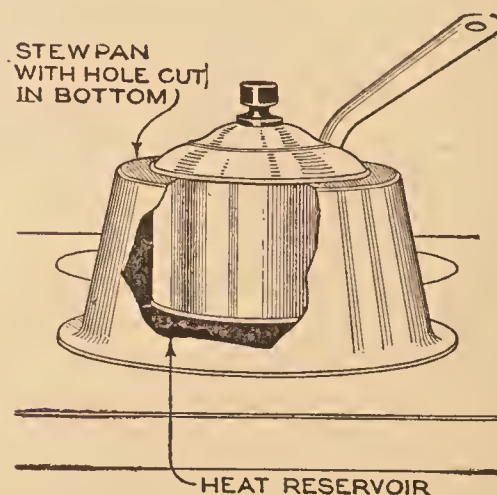


is extracted from it. While the audience is still wondering how it was done the operator reaches into a coat pocket, produces the candle lighted, and places it back in the candlestick. The apparatus required consists of the trick candlestick illustrated, two imitation candles, a cardboard cylinder, and a silk flag, or handkerchief. The base of the candlestick is hollow, and when the cylinder is placed over it, a trigger is pressed that allows the candle to drop out of sight into the hollow base. The flag is folded and placed like a lining within the cylinder, and is kept from sight of the audience by a paper lining, as indicated in the drawing. The cylinder is prepared and the second candle placed in the magician's pocket before the performance. This candle has a match head for a wick, and as it is taken from the pocket the match is struck on a piece of sandpaper that is pinned in a convenient place on the inside of the coat. The candlestick can be bought ready-made, or it may be made from wood. The hole in which the candle drops must be large enough to make a snug but free fit, and deep enough to conceal the candle entirely when resting upon the bottom. A small wire pin projects through the can-

dlestick just far enough to hold the candle in place, yet so that a very little movement will release it. A bent strip of sheet metal serves as a trigger, and this is fastened at its center to the candlestick, very loosely. When the cylinder is placed over the candle the performer presses the trigger and lets the candle fall. In this position the top of the candle should be even with the wire pin, so that when the second lighted candle is set in the candlestick it will rest on top of the first one. The candles can be made from metal, paper tubes, or wood. If tubes are used, corks are inserted into the ends to hold wicks. In any case, have a wick on one candle and a small hole for a wick on the other. Enamel them white. For the light effect in the second candle, a match end is inserted in the wick hole. The cylinder which is put over the candle to hide it can be made from cardboard or sheet metal and finished as desired. Fold the flag and place it so as to be close to one end of the tube. When taking the flag from the cylinder, hold the cylinder and the paper lining tightly together, at the end farthest from the flag, so that the latter can be pulled out without disturbing the paper.—Norman B. Taylor, Pomona, Calif.

An Efficient Stewpan

The efficiency of the ordinary stewpan can be considerably increased, and at the same time, the quantity of gas required to boil the contents of the pan will be cut down. All this is done by cutting a hole, just large enough to permit insertion of the stewpan, in the bottom of an old pan, as in the illustration. It will be noted that all the heat rising within the covered area will come into contact with the sides as well as the bottom of the upper pan. Another feature of value that commends an arrangement of this sort, is that the contents of the stewpan will not burn as quickly as when in actual contact with the stove top. As a glue-pot improvement, where gas is used for heating the pot, the same idea can be applied with excellent effect.



Typewriter-Ribbon Substitute

When the typewriter ribbon wears out and another is not easily obtainable, a sheet of carbon paper can be used with good results. The carbon paper is fed into the machine between two sheets of paper, with the carbon face in contact with the face of the letterhead. The outer sheet of paper is used to reinforce and protect the carbon paper.—Chas. N. Shaw, Jr., Gordon, Ga.

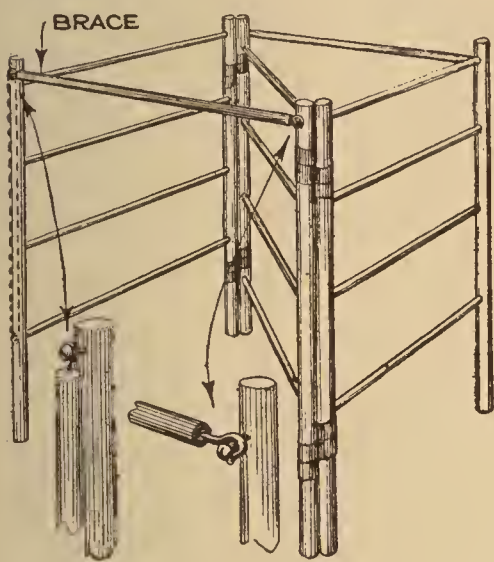
Bracing the Folding Clotheshorse

The common folding clotheshorse admirably answers the purpose it is intended

for, but suffers from lack of stability, a slight push being enough to make it fall over or close.

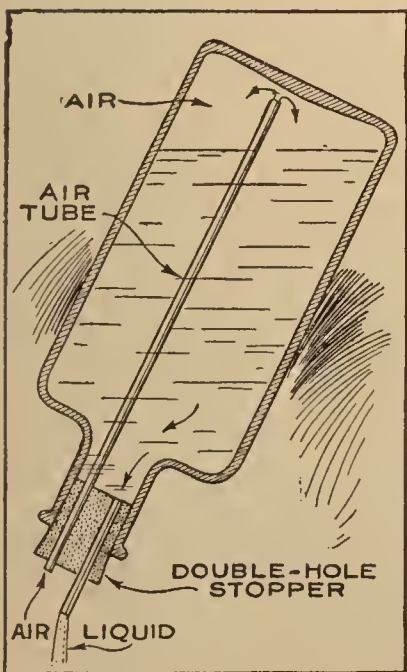
To overcome this, the two bars or braces shown in the drawing were fitted to the clothes-

horse, not only making it much more rigid, but affording additional drying space. Round-headed screws were turned into the posts as indicated, and a screw eye into each end of the braces. One of the eyes was closed, while that in the opposite end is open and free to slip over the screw.—M. E. Duggan, Kenosha, Wis.



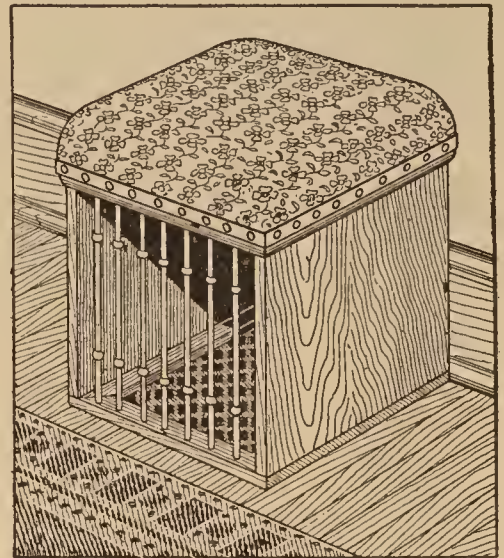
Attachment for Pouring Liquids

One of the easiest and most effective methods of rigging a bottle for pouring liquids without removing the cork is shown in the drawing. Two pieces of glass tubing are inserted through holes in the stopper in the manner indicated. Using an arrangement of this character, the liquid will flow from the container smoothly and without bubbling.—Curtis Ralston, Chicago, Ill.



A Seat for the Furnace Register

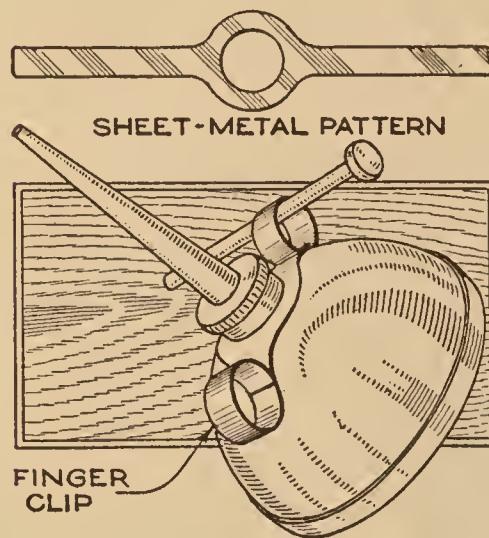
In houses heated by a hot-air furnace, a better distribution of the warm air along the floor, where it is most needed, can be obtained by using register boxes such as that shown in the drawing. In addition to this, it affords a convenient seat for getting warm quickly when coming from the outside cold. The box is a little larger than the outside measurements of the register plate, and at least one side should be open. The top may be padded and covered to match the upholstery on the furniture in the room.



Finger Clips for Oilcans

A simple device, which has been found advantageous in the handling of an oil-

can of the spring-bottom type, especially when the hands are greasy, consists of a finger clip, made and attached as indicated. The clip is made from a strip of sheet metal, with an opening at the center to fit over the neck

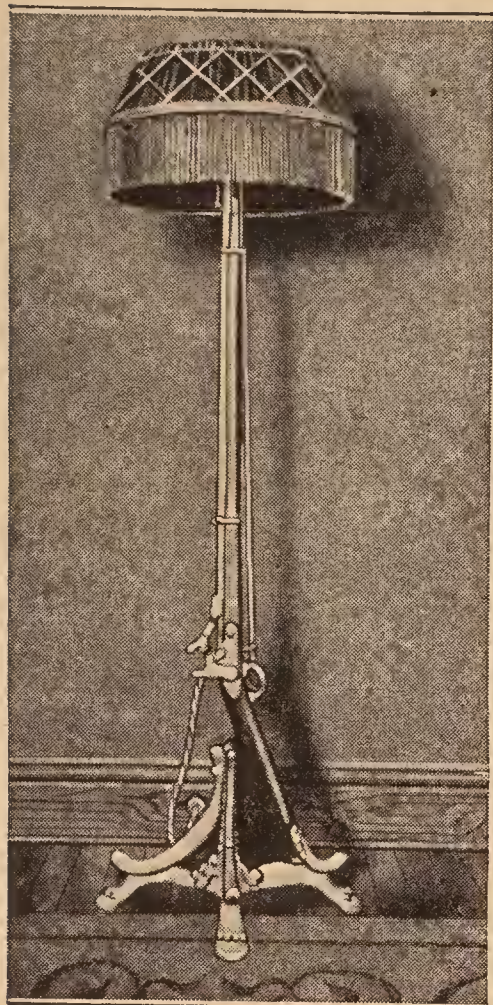


of the can, where it is held in place by the spout. The ends of the sheet-metal strip are formed into rings for the insertion of the first and second fingers. All edges should be finished off smoothly to prevent possibility of cutting and scratching the skin. The oilcan may also be hung up by the clip, and in this manner kept out of the way.

When playing cards become old, worn, and rough, making it difficult to deal and shuffle them with the desired speed, they can be made almost as slick as new by dusting them freely with talcum powder.

Floor Lamp Made from Old Musket

The attractive floor lamp shown in the photograph is made up from an old army



musket of the percussion-lock type, long since obsolete, and the metal base from a familiar style of hall tree or, as it is sometimes called, a "costumer." In the absence of a base of the kind illustrated, one could easily be made in wrought iron that would embody the maker's own ideas. In this instance, the lamp cord is passed up through the

barrel to a suitable cluster fixture inserted into the muzzle. The effect is completed by the addition of a suitable shade.—Perry W. Sitton, Rawlins, Wyo.

Building a Snow Lighthouse

The photograph shows a lighthouse made from snow that was a decided hit in the neighborhood when the candle placed inside of it was lighted.



The lighthouse was made by rolling three large snowballs of different diameters and placing them on top of each other, the largest one at the bottom to form the base, and the smallest at the top for the light chamber. Snow was then packed tightly at the joints to make the tapered cylinder, which was about 5 ft. high, 3

ft. in diameter at the base, and 20 in. in diameter at the top. A space was then hollowed out for the light chamber, with

four openings for windows, which were protected with glass, and a candle was inserted in the center of the cavity. In order to make the candle burn, a hole was made in the top leading into the light chamber, and another hole from a point somewhat below the windows to conduct air to the candle. When the candle was lighted, the air supply through these openings allowed it to burn perfectly.—Melville S. Munro, Tufts College, Massachusetts.

Identifying Switches in the Dark Room

In the complete photographic dark room, three colored lights are used; orange, for printing; red, for developing plates, and green for panchromatic and autochrome plates. Sometimes, when one desires to turn off the light in use, the wrong switch is turned, one of the other lights turned on, and the plates or other sensitized material affected by that kind of light are fogged, if not ruined entirely. An effective method for preventing this mistake makes use of the fact that a substance of a particular color, viewed in light of its own color, appears white, and viewed in any other color, black. Thus, in the dark room, an orange card can be seen under the orange light, but disappears entirely under any other light. Take an orange-colored card and tack it to the dark-room wall over the switch that operates the orange printing light; red and green cards are similarly provided for the switches operating the lamps of their respective colors. The cards should be placed against a dark background, and the colors used should correspond as nearly as possible to the shade of light that will fall upon them, to make the arrangement satisfactory.—Charles I. Reid, Millersburg, Pa.

Leaf Mulch for Trees

In the forest, under natural conditions, dead leaves form a natural and efficient protective covering for the roots of trees; beneath are dead leaves in various stages of decomposition, above a leaf mulch. Under the somewhat artificial conditions of the home orchard, the back yard, or lawn, the leaf mulch is a protection, the importance of which is not generally appreciated. The tree roots may be very near the surface and the crown may be exposed. In the fall the leaf mulch does not form, and the cold snaps in open weather freeze the roots and crown. This is

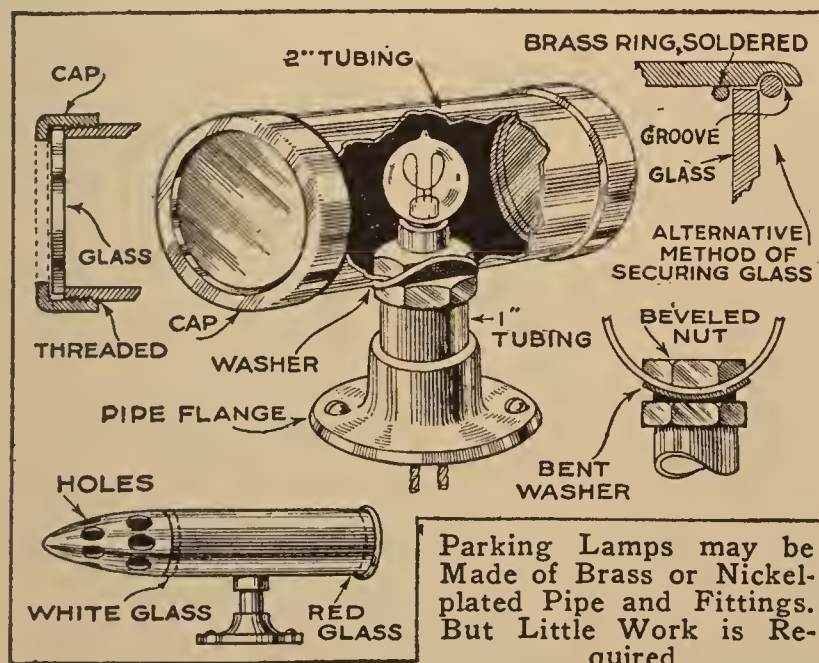
especially true of peach and plum trees, and the so-called "yellows" of peach trees is caused by winter injury to the roots and crown. The moral of all this is, that the roots and crown should be well protected in winter. If the owner has dug around the crown hunting for borers, he should take care that the earth is well replaced. Then he should use a leaf mulch. This is the very best way to dispose of the leaves that accumulate in the fall.

The ground underneath the tree should be covered as far as the branches extend. The leaves should be packed down to a depth of at least 2 in.; 6 in. is better. Cover with long straw, cornstalks, wire netting, or other material, to prevent the mulch from blowing away.—Oscar C. Place, Boulder, Colo.

An Automobile Parking Lamp

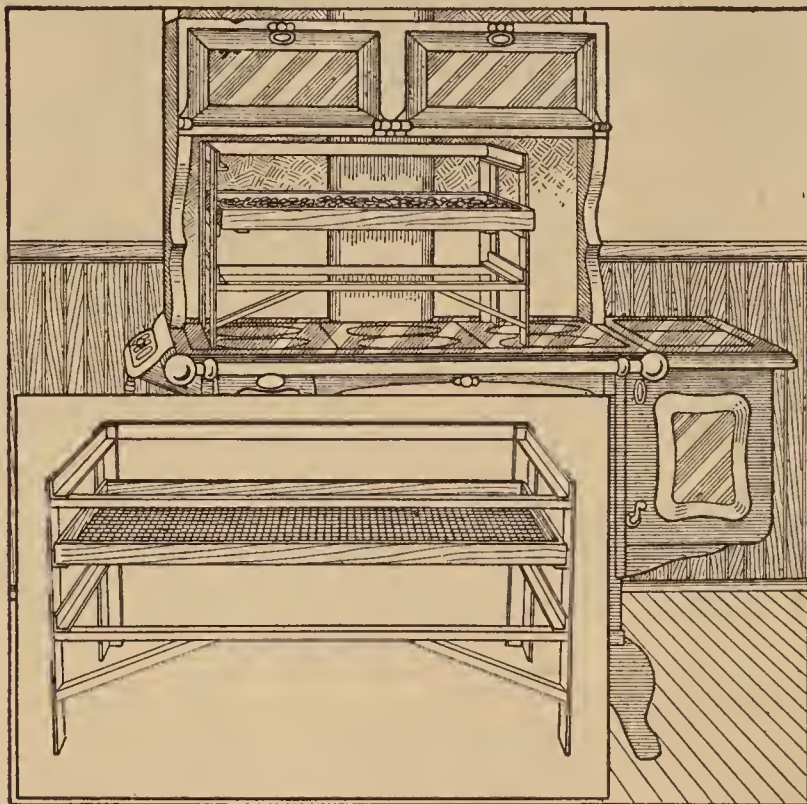
Nickelplated plumbing fixtures, or brass pipe and fittings, can be used to make a serviceable, ornamental, and efficient automobile parking lamp.

The drawing shows the constructional details of such a lamp, made from a 3-in. length of 2-in. pipe, joined at right angles to a short length of 1-in. pipe and a flange, the lamp socket being fastened to the smaller pipe with solder. The two parts are held together with locknuts, the inner one having one face beveled to conform to the curve of the pipe, while a concave washer is inserted between the outer nut and the body of the lamp. The glass can be held with a split wire ring fitting into a groove, or by a screw cap, the latter being, perhaps, the easier to use. Individual ideas may be used in making such lamps, as shown in the lower illustration; this being made by a former soldier from a one-pounder shell.—G. A. Luers, Washington, D. C.



Fruit and Vegetable Drier

One of the most convenient methods of preserving fruits and vegetables, or for disposing of a surplus, consists in removing practically all of the water that con-



A Homemade Fruit and Vegetable Drier That can be Set on Top of the Kitchen Range or Inserted into the Oven

stitutes the bulk of such products; this is frequently referred to as "dehydrating," but more commonly as "drying."

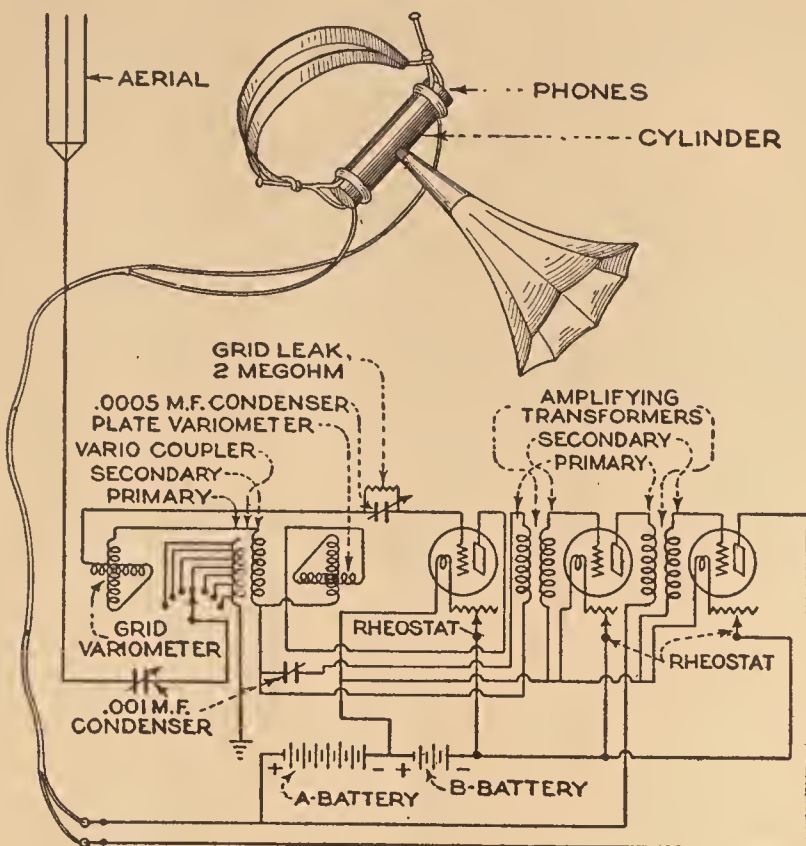
The illustration shows a compact and substantial drier that can be used either on top of the kitchen range or in the oven, where it will not greatly interfere with the usual cooking operations. Heavy galvanized sheet-iron strips are used to make a stand for holding several sliding, screen-bottomed trays. The parts of the stand are all riveted together, and the trays rest upon slides made of light angle iron, or formed by bending strips of sheet metal at right angles. The trays are made of wood, with bottoms of screen wire, and are about 1 in. deep, as the drying is completed more quickly and satisfactorily if the produce to be dried is spread out in a thin layer. It has also been proved that drying at low temperatures, although requiring a little more time, preserves a better color in the dried product.—C. R. Gains, Colfax, Ia.

Electric Iron as Arc Rheostat

For providing resistance in a stereopticon lamp, or for similar light duty, a very efficient rheostat is provided by connecting an ordinary electric iron in the circuit. Care should be taken to place the iron on a stand, or upside down.—George W. Mingie, Montreal, Que.

A Homemade Loud Talker

Every radio enthusiast wants a loud talker, but the price is prohibitive to all save comparatively few. However, with



A Loud-Speaking Arrangement for the Radio Experimenter: Such an Amplifier Costs Practically Nothing, and with It Radiophone Music and Speech are Greatly Increased in Volume

the odds and ends about the workshop it is possible to build a loud-speaking telephone that will bring in faint signals with great clearness, when the circuit illustrated is used. This particular circuit is one of the most efficient ever devised and makes use of the regenerative system with two steps of amplification. The horn used is a familiar type of phonograph horn, and the cylinder shown in the drawing is of bakelite or fiber, 7 in. long, and of a diameter suitable for the type of phones used. A hole is cut in the middle of the tube for attaching the horn. Various methods can be devised for attaching the horn, such as using sealing wax and the like, but the best method is to rivet a short piece of tubing to the cylinder to make a tight-fitting socket. The receiving set is then tuned to maximum signal strength, and the phones are clamped over the ends of the cylinder, as shown in the drawing. The vacuum tubes used in the circuit may be of any of the standard makes, a soft, or No. 1, tube for the detector, and hard, or amplifying, tubes for the two steps of amplification. The amplifying transformers are of standard make and of the audio-frequency type. The variometers and vario coupler are of the ready-to-assemble type, now commonly obtainable.—F. L. Brittin, Chicago, Ill.

Coal-Chute Shield

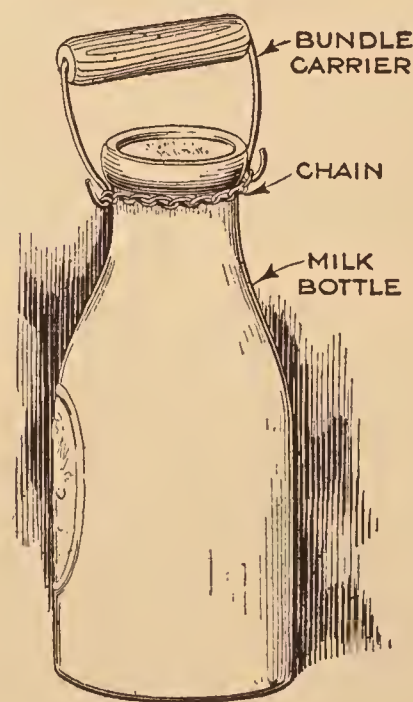
After the coal has been shoveled into the basement one usually finds that the woodwork adjacent to the coal chute presents an unsightly powdering of coal dust, and that the wood is even marred where lumps of coal have struck it. To prevent this, the shield described has been used with complete success.

Cut four 2 by 2-in. uprights into lengths that will reach from the ground to within 2 ft. above the top of the coal-chute door. Place two of these the width of the door apart; place the other two on the outside of these, 18 in. away. Nail sheathing boards, or, better, matched stock, all the way across the uprights for a distance of 2 ft., commencing at the top. From there on, board up only the space between the outside uprights on either side, leaving an opening in the middle.

At the height of the water sill from the ground, tack pads of a double thickness of canvas or old carpet to the back of the uprights to prevent them from chafing the paint on the house. At each side of the shield, fasten a screweye in the sill and in a corresponding place on the outside uprights fasten a hook so that the device can be held tightly against the wall. —Leo Rosasco, Indianapolis, Ind.

Carrier for Milk Bottles

For carrying a bottle of milk so that the fingers will not be cramped by gripping it around the neck, a simple little carrier can easily be made. The wire



is removed from a common bundle carrier, a longer piece substituted for it, and the ends bent down in such a way that there will be a distance of about 3 in. from the handle to the hooks at the ends of the wire. Then the center of a piece of small chain is connected to one hook so that there will be sufficient chain just to fit around the neck of a milk bottle. In use, the chain is brought around the neck of the bottle and the loose ends placed over the other hook on the carrier.—L. B. Robbins, Harwich, Mass.



A Portable Fishing Shack

By P. P. AVERY

ON inland streams and lakes that are usually frozen over for a great part of the winter, the method of catching fish through holes in the ice is quite generally practiced. However, the fisherman as he sits on the ice, but indifferently protected from the chilly blasts by a rude, and, generally, ineffective windbreak, is not only uncomfortable but exposed to rheumatism and kindred ills. The drawing shows a fishing shack that can be pulled to different locations on the ice, in which the

ice. The house is raised for application of the runners by means of a lever, or an automobile jack can be carried along for this purpose.

The front runner is mounted on an outrigger, hinged to the shack, and two stout, hinged braces are used to keep it in a horizontal position when the runner is in place. By means of the handle attached to the front runner it is possible to pull the house in any direction.

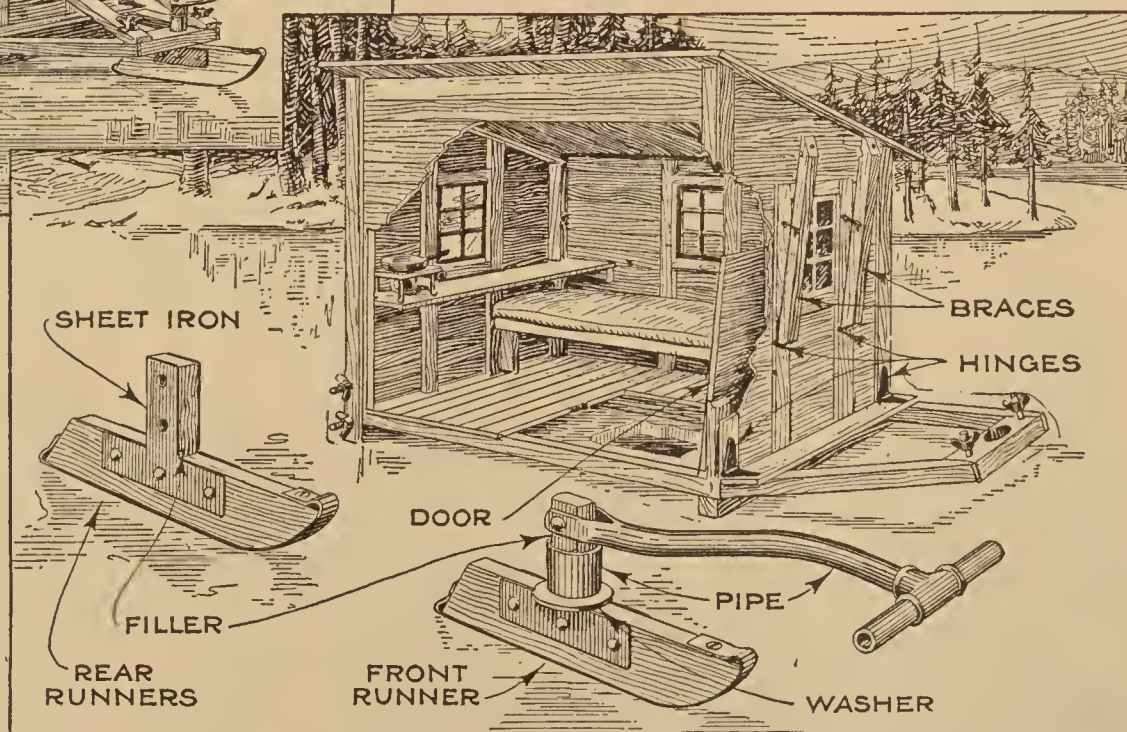
The total cost of building such a shelter is slight, and the expense is well worth while to those doing much ice fishing. The warmth of the building can be increased greatly, without an undue increase in weight, by using any one of various kinds of wallboard over the studding. Inside, the fisherman is provided with food, shelter, and warmth, and can remain on "location" for several



fisherman is fully protected at all times, and where he can prepare his meals, or even sleep, in warmth and comfort.

The house can be made to almost any convenient dimensions, but the self-evident fact that the smaller the building, the easier it will be to pull, should be borne in mind. If desired, the shack can be built in sections so as to be stored easily when not in use.

All three runners are detachable and held in place with bolts and wingnuts. In many cases it is necessary that the runners be removed to prevent a strong wind from blowing the shelter along the

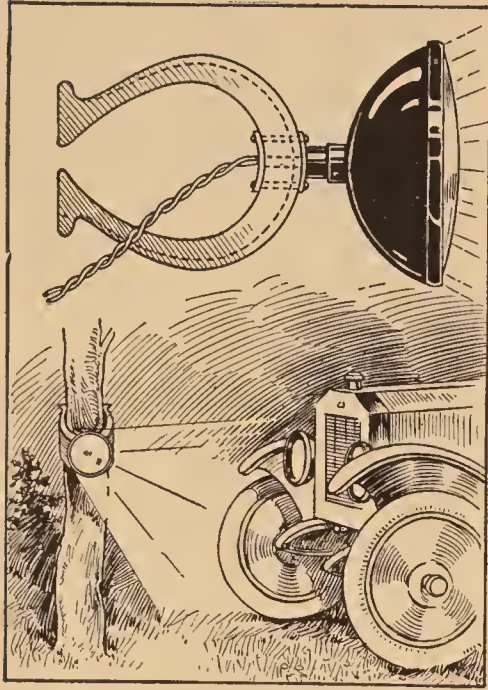


Portable House and Shelter for the Ice Fisherman, That can be Towed to Any Location on the Ice: Comfortably Housed and Protected from Wind and Cold, with Food, Shelter, and Warmth, the Fisherman can Remain on the Ice for Several Days

days if he so desires. It may be found necessary to move the shack a distance of a foot or two every five or six hours, as otherwise the runners might easily freeze to the ice.

Holder for Trouble Lamp

A convenient trouble-lamp holder, that can be slipped around a small tree or over the tire of the car, is made from a section of an old casing, about 4 in. long. A hole is cut through the center of the casing section, and a dash-type socket inserted and secured by means of rivets, to a metal plate on the inner surface,

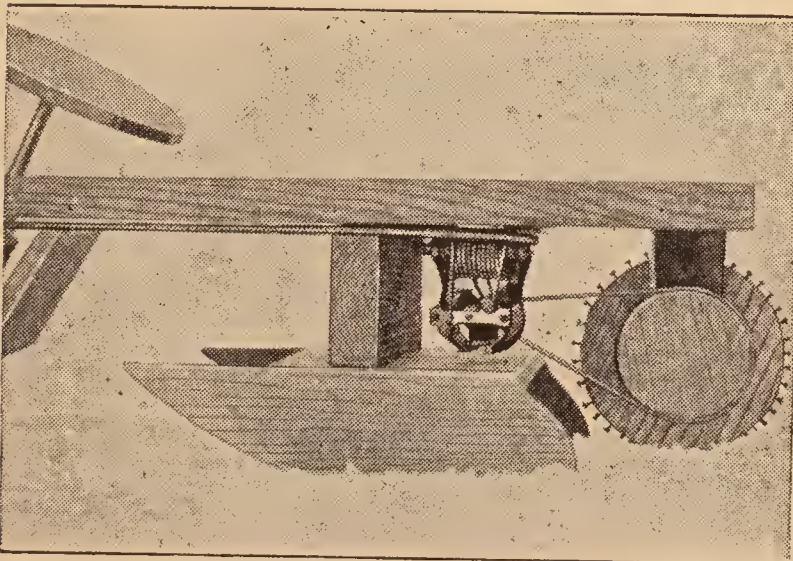


as illustrated in the detail. The socket is connected to a suitable length of cord, fitted with a plug, and the addition of a light bulb makes it ready for use. The lamp may be improved by soldering the reflector and lens from a bicycle search-light over the socket.

When in trouble, simply spread the beads of the tire and allow it to close around anything that is not too large for it to grip, and the light will be held in the same position as long as desired.—L. B. Robbins, Claremont, Calif.

Electric-Lighting Plant for Sled

An electric-lighting plant was installed on a coasting sled to give a brightly lighted roadway for the enjoyment of night coasting. A small six-volt gener-



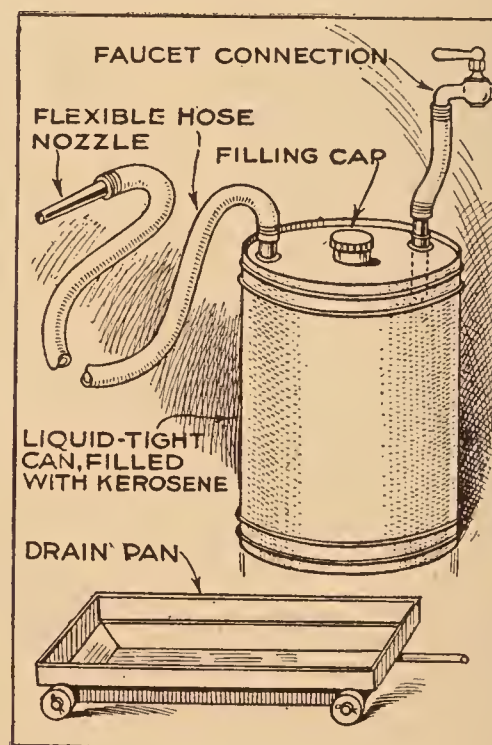
For the Enjoyment of Night Coasting, This Sled was Fitted with a Small Generator, Driven by a Spiked Wheel Fastened by a Bracket to the Rear of the Sled

ator was secured under the rear end of the sled and was driven by a spiked wheel

in contact with the surface of the snow. The drivewheel should be of a diameter that will fit nicely between the sled top and the snow surface, and can be cut from a piece of seasoned 1-in. stock with a compass saw. Several 10-penny nails are driven, to within $\frac{1}{4}$ in. of the heads, into the edge of the wheel to obtain traction. The drivewheel is supported by an axle, at the opposite end of which is fastened a wooden drive pulley, 6 in. in diameter. The pulley on the dynamo shaft is placed in line with the drive pulley, and a piece of heavy fishline is used for a belt. The terminals of the generator are connected to a small six-volt electric lamp attached to the front of the sled. Naturally the light burns only when the sled is running.—F. E. Brimmer, Cazenovia, N. Y.

Kerosene Cleaner for Use with Hydrant

Kerosene is an excellent cleaning medium for dirty automobile engines and transmissions; the most effective method



of using it is to apply it to the surface to be cleaned in a fine spray or stream, as the jet will cut the greasy dirt and oil down to the metal.

A method of applying kerosene under pressure without pumps or extra effort consists in connecting a tight can filled with kerosene

to any faucet or hydrant by a rubber hose; this will give a pressure of about 40 to 50 lb., which is as much as is needed to make an effective cleaner. There is no need of separating the water from the oil, as the kerosene, being much lighter than the water, will always be at the top of the can and will consequently be forced out through the hose until the supply is exhausted. To prevent waste of the kerosene, a large flat tray or pan, with rollers attached for convenience in placing it under the car, should be used. The dirt that is caught should be allowed to settle; the oil may be used over again indefinitely.—G. A. Luers, Washington, District of Columbia.

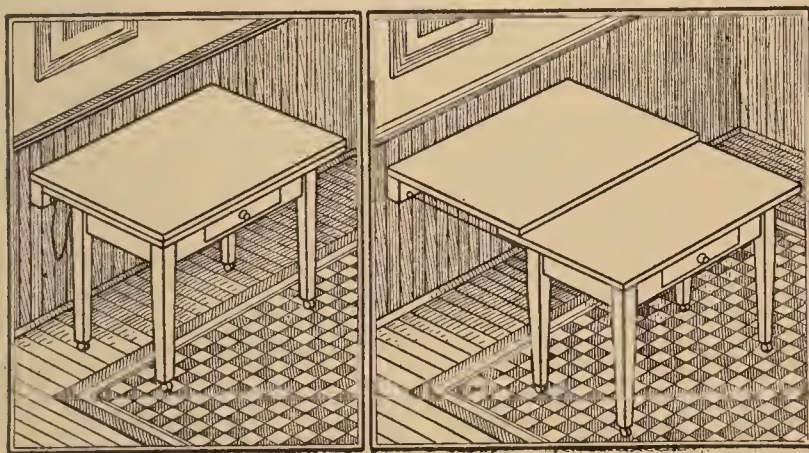
Cleaning a Fountain Pen

Lack of use and inks that gum are the frequent and most common causes of clogging fountain pens, and, of course, the only method of restoring them to satisfactory service consists in removing the hardened or gummed ink. In such cases, fill the pen with warm water and grasp it firmly, with the point away from the body. Raise the hand straight above the head, and, with a quick, sweeping motion, bring it downward almost to the floor. The centrifugal force will usually be sufficient to force the water out through the pen with such velocity that some of the dried ink is washed out. The operation is repeated until the obstruction is removed and the pen entirely cleaned. With self-filling pens, the sweeping motion is not necessary, as the water, held in the rubber sack, may be forced out through the pen, by raising the filling lever, or depressing the filling "button," according to which-ever is fitted.—Barney R. Cole, Opp, Ala.

Extension Table for the Kitchen

The table shown in the drawing is very convenient in a small kitchen, where, although an ordinary-sized kitchen table answers all common purposes, occasions frequently arise when a larger table is a necessity.

In the construction of an extension table of this type, an extra table top, the same size as that of the table, is fastened permanently to the wall, in such a manner that it is at all times supported by the table underneath, which is prevented



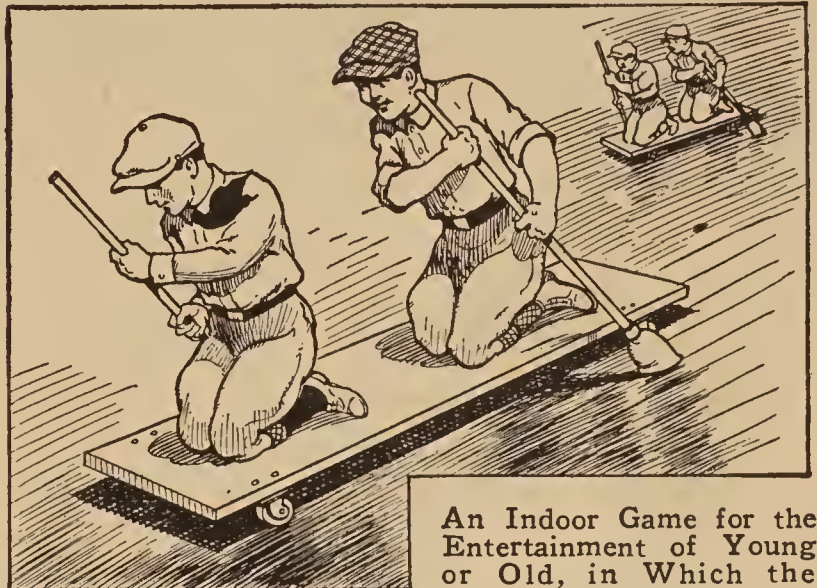
An Extension Table for the Kitchen? An Extra Table Top is Permanently Attached to the Wall and is Supported at all Times by the Table

from being pulled too far forward by a cord or wire at each end of the table.—Harold E. Benson, Boulder, Colo.

☞ Vaseline or cold cream, rubbed well into the hands before doing grimy work, makes it possible to wash them clean with little effort when done.

An Entertaining Indoor Game

An original indoor game, that, as yet, remains unnamed, will provide entertainment for almost any kind of gymnastic meet, the only apparatus being at least



An Indoor Game for the Entertainment of Young or Old, in Which the Players Endeavor to Push Themselves across a Floor in a Straight Line While Kneeling on a Platform Mounted on Ball-Bearing Casters

two rolling platforms and a sufficient number of plumbers' force cups, such as used for removing obstructions from sinks and other fixtures. The platforms should be of sufficient dimensions to accommodate comfortably two persons in the position shown. A ball-bearing caster at each corner of the platform permits the arrangement to roll easily in any direction.

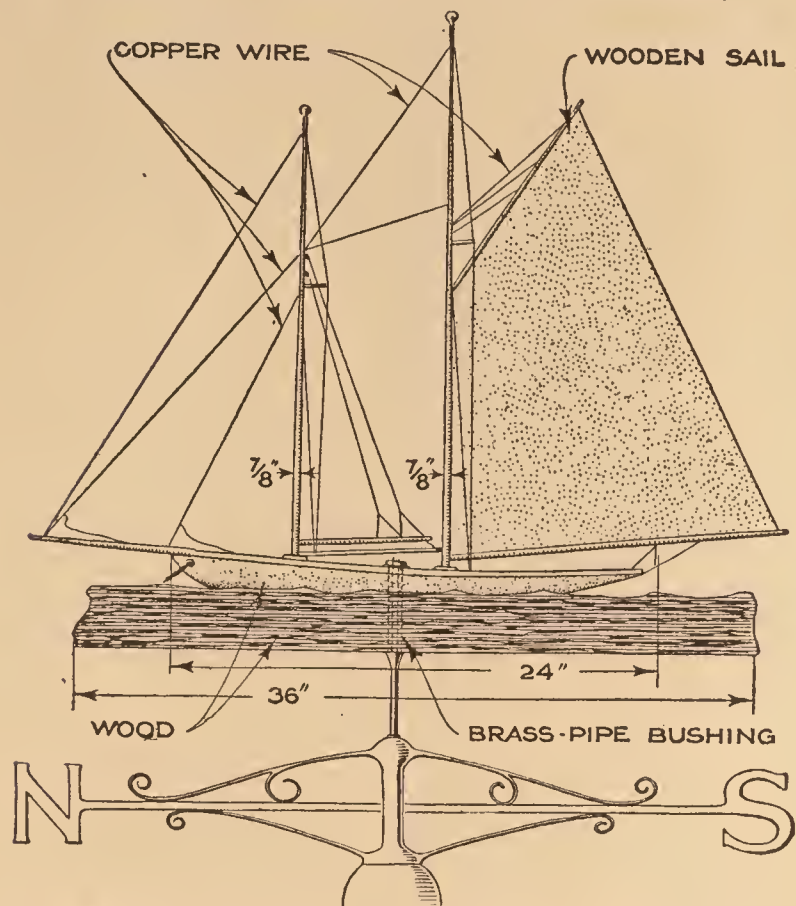
In use, two players on their knees propel themselves along the floor by means of the force cups, the object being to keep the rolling platform and its crew traveling in a straight line, something that demands a little practice and skill when the casters are kept well lubricated.—M. E. Duggan, Kenosha, Wis.

Enlarging from Wet Negatives

The method used by many press photographers for rapidly making prints and enlargements from wet negatives is as follows: After coming from the fixing bath, the negatives are given a few seconds' rinse under the tap and are then put directly, while still wet, into the enlarging lantern, and several prints are made on glossy bromide paper. The prints get the merest rinse in the hypo bath, and are then dipped into a bath of wood alcohol, where they are allowed to remain for about three minutes. After being removed, they are squeegeed onto ferrotype plates and dried with hot, dry air, obtained by using a gas stove and an electric fan. By these means, photographs can be supplied in about one-half hour.

A Weather Vane for the Boathouse

A very attractive weather vane may be made in the form of a sailing vessel at anchor, with the mainsail set and headsails furled. Any type of vessel may be



A Weather Vane for the Boathouse Shows a Two-Masted Schooner, with Its Mainsail Set and Headsails Furled, Always Heading into the Wind

used, but a two-masted schooner makes, perhaps, the neatest appearance.

The hull, with the water and bowsprit, is made in one piece, from 1-in. board, pointing the bow to a thin edge and shaping the stern as much as the thickness of the material will permit. The masts may be made round, with flat sides to which the thin wooden sail is fastened with small galvanized brads, the booms being made in the same manner as the masts. A shoulder is made on the masts, about 2 in. from the lower end, making a step, about $\frac{5}{8}$ in. in diameter, so that the sticks can be driven into a corresponding hole in the deck.

The sails are made of wood about $\frac{1}{4}$ in. thick, and copper wire is used for the rigging, while a piece of iron pipe is inserted in the middle to serve as a spindle bearing. The compass points and spindle, while they can be made, can better be bought through a hardware dealer.

The height of the building or flagpole should govern the size of the vane, but it is well to exaggerate the size of the spars and rigging a bit, or they will appear too small if the vane is elevated to a considerable distance. The mainsail will always keep the bow of the boat pointed into the wind.—J. Arthur Stevens, East Boothbay, Me.

Ferrotyping Glossy Prints

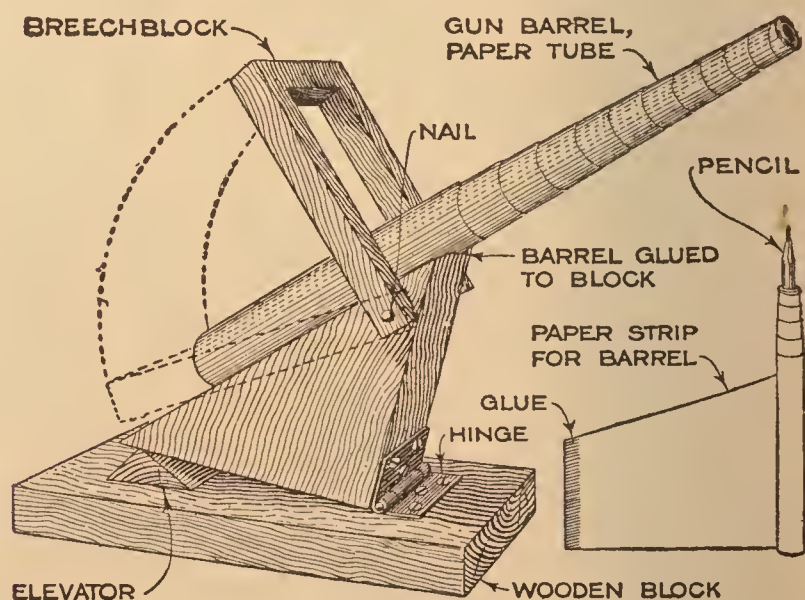
Glossy photographic prints can be made that will strip from the ferrotype plates much easier than usual, and they will also stand the ordinary method of mounting with starch or flour paste without any dulling of the glossy finish.

The method is simple, and consists in applying to the prints a solution composed of 1 oz. of formalin, the so-called "formaldehyde," to each 20 oz. of water. The prints are soaked in this solution for five minutes, washed in two or three changes of water, and ferrotyped in the usual way on enameled ferrotype plates.

A Breech-Loading Firecracker Cannon

A cannon for propelling firecrackers into the air, where they explode, can be easily made from a few pieces of wood and a paper tube. As the ordinary firecrackers are about the same diameter as a pencil, the 7 by 35-in. strip of tough paper, which is used to form the barrel, is wound around a lead pencil, and the ends are glued to prevent it from unwinding. When completed, the barrel is glued to a triangular block of wood, which is fastened to a 3 by 5½-in. wooden base with a hinge, as shown in the drawing. A smaller triangular block, under the rear of the larger one, permits control of the muzzle elevation by moving it back and forth. A U-shaped breechblock is attached to the mounting as shown.

Two firecrackers are required to fire the cannon. The fuse of one is cut short, and the cracker pushed into the breech of the gun, with the fuse toward the rear. The second firecracker is cut off at the end



A Toy Cannon from Which Firecrackers are Discharged to Explode in the Air: It Is Entirely Safe

opposite the fuse, just above the clay plug, and then shoved into the breech behind

the other, allowing its fuse to protrude over the breech block.

By lighting the exposed fuse, the charge in the cut firecracker is ignited, and because its end is not plugged, the force of the explosion drives out the whole firecracker and at the same time touches off the short fuse.—F. C. Brown, Brooklyn, N. Y.

Preventing Prints from Slipping

To prevent prints from slipping on a table, when they are being rubbed with an eraser, or other medium, for cleaning the surface, glue two sheets of fine sandpaper together, back to back. The prints are placed on the upper surface, and as there is a rough surface in contact both with the table and the print, there is little possibility of slipping.

A strip of fine sandpaper, or emery cloth, glued to the edge of the print trimmer, will also prevent prints from slipping after they have been lined up under the blade.

A Cement for Porcelain

A cement for mending porcelain or chinaware, and one that has excellent adhesive qualities when fresh, is made by adding 4 oz. of ordinary fish glue to 6 oz. of water glass, or sodium silicate, together with 1 oz. of precipitated chalk. The whole is rubbed into a thick paste.

The cement is used by applying a little to the edges of the broken parts; these are pressed together, and the cement allowed to dry in a warm place.

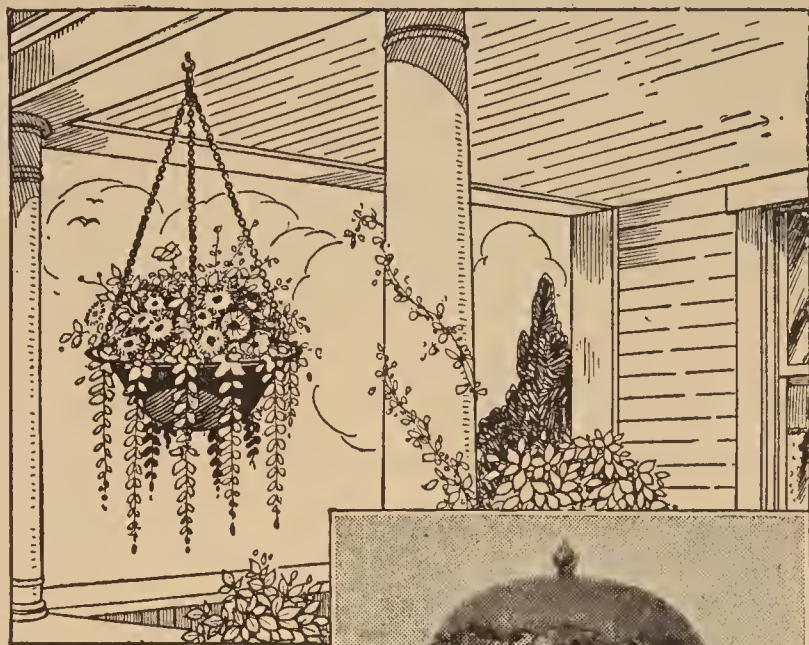
Utilizing Steel Trench Helmets

Steel trench helmets, which can be obtained at a very small cost in any of the so-called "army and navy stores" in the larger cities, when suitably decorated and mounted, form very attractive flower baskets or lamp shades. When used as flower baskets, three holes are punched, at equal distances apart, through the rim; chains are fastened through these holes, to support the helmet. The helmets may also be used on a simple wooden frame, as a flower stand, instead of a hanging basket.

In the lower illustration a helmet is shown transformed into a very attractive lamp shade. The decoration, while a matter of individual taste, may, if the maker is a former soldier, indicate the branch of the service to which he was attached.

Thus, instead of the flowered design of the photograph, the infantryman might

use a running design of crossed rifles, with the rim painted light blue; the engineer, a design with a castle motif, the rim



Attractive Hanging Flower Baskets and Lamp Shades May be Made from Steel Trench Helmets. These Are Very Cheap, and Afford an Unlimited Opportunity for Individual Treatment in Decoration, Either by Painting or by Coloring the Steel Surface with Chemicals



being silver, and so on. A very agreeable finish is produced by first covering the helmet with a coat of gold-bronze paint, then stippling over with green and blue, thus producing an old-bronze effect that is attractive either alone or as a background for other decorations. The inside should be enameled white, to provide a reflecting surface.

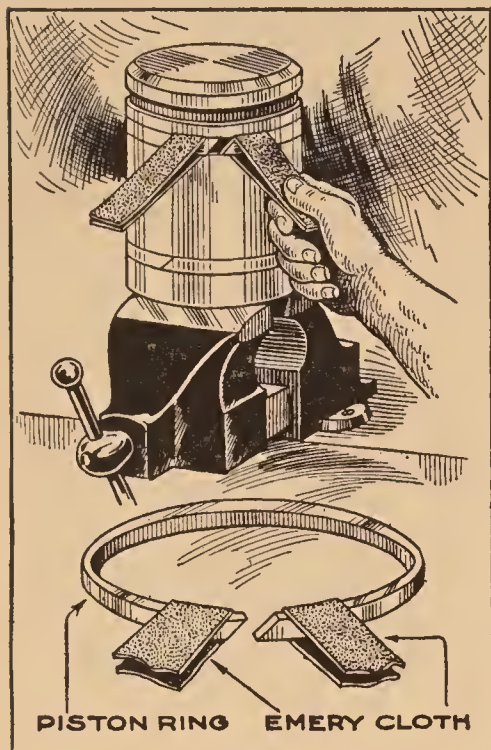
For those who have access to means for polishing the outer surface, it is suggested that they bronze the helmet by first polishing, then slightly heating it, covering the surface with a paste of antimony chloride, and allowing the helmet to stand until the desired shade of bronze appears. The paste may be made faster in action by adding a little nitric acid.

Another method of finishing is to immerse the helmet in a heated solution of 10 gr. antimony chloride, 10 gr. gallic acid, 400 gr. ferric chloride, and 5 fluid ounces water. The first color to appear is a pale blue; this passes through the darker blues to a purple, and finally to gray. The process may be stopped when any desired shade has appeared.

With these suggestions as a guide, anyone will be able to produce a very striking ornament, and one that, to the veteran, will have an added sentimental value.

Cloth Strips Remove Piston Rings

A simpler method for the removal of piston rings than that illustrated could hardly be devised, as the rings can be



the ring will immediately be opened so that it can easily be lifted off the piston.

taken off or replaced in a second. Two strips of emery cloth, about 4 in. wide and 8 in. long, are torn off; these are doubled and one strip slipped under each end of the ring. By pulling on the cloth strips in opposite directions, as indicated in the drawing,

A Window Greenhouse

The drawing shows a simple window greenhouse that can be easily erected



from ordinary window sash, assembled, and fastened to the sill, top, and sides of the window casing. The roof is also a sash, but is hinged at the back, next to the house, so that it can be raised in fine weather. A cord attached

to an angular bar, which is pivoted to the side, as indicated, is used for raising or lowering the top.

A window greenhouse should preferably be placed on the south side of the house, so as to get the full benefit of the sunlight. Shelves and brackets can be fitted inside for the accommodation of plants that have trailing or drooping habits. Sufficient heat will be furnished from the room to make the growing of hardy plants an easy matter. Among these are violets, pansies, English daisies, lettuce, parsley, radishes, and, in fact, any flower

or small vegetable that can be grown in the early spring and late fall in cold frames.

If desired, the greenhouse may be made so that it can be taken apart and the various parts stored away during the summer.

Detachable Handles for Barrels

Where barrels and kegs that must be kept in an upright position are to be handled, the detachable handles illustrated



simplify the difficult matter of getting a convenient hold on the barrels when handled in the usual manner.

Two rubber-faced hardwood handles of the shape shown in the drawing are provided, and a suitable length of $\frac{1}{4}$ -in. link chain is fastened to each side of both handles. On the ends of two of the chains grab hooks are provided that will hook into any link of the chain. The handles are placed just slightly above the bilge and the chains adjusted to the proper length. As the handles are lifted the action clamps them to the sides of the barrel.

Candelabrum Made from Coat Hanger

In camp, in a spare room, or elsewhere, it is sometimes desired to place a pair of lighted candles so that they will not come into contact with anything inflammable, and without a candlestick this is usually thought impossible.



The photograph shows a method by means of which two candles can be held in a wire coat hanger, suspended from the ceiling, and thus swung clear of anything likely to catch fire. The rounded ends of the hanger are squeezed together to hold the candles tightly and as the candles melt, the softened wax will run down and harden around the bottom, making them still more secure in the holder.—L. B. Robbins, Harwich, Mass.



UTILIZING NEW STEEL TRENCH HELMETS

IN SELECTING the articles in our recently closed prize competition, on "How to Use New Trench Helmets," of which the government has several millions for sale, it has been the intention of the judges to select those that seemed most practical in use, not too difficult to make, and most likely to provide demand for the largest sale of the helmets. Many of the articles submitted were more ornamental than those selected, and as useful, but required considerable effort to make; this was considered likely to lessen the consumption of the helmets. Although not in the prize-winning class, several other ideas sufficiently meritorious are presented along with the winning ideas.

Trench Helmets Protect Plants from Frost

The premier prize winner is J. A. Goodall, of Mountain Home, Ida., who used several of the helmets in his garden last spring to protect early plants from frost when the temperature fell too low. The protection afforded the plants was so complete that he has taken steps to secure a sufficient number of helmets to protect his entire melon crop next spring. He intends to plant about two acres of melons, and by protecting them in the manner described, hopes to get his crop on



The First-Prize Winner Made Use of Trench Helmets Last Spring to Protect Tender Melon Plants from Frost. The Protection Was Complete, the Helmets Being Heavy Enough to Maintain Their Position in the Strongest Wind

the market about a month earlier than usual. The helmets are specially fitted for the protection of such plants as melons, squashes, and the like, which have no upright stalk. The helmet is heavy enough to remain in place during the hardest wind.

Oil-Drip Pans Made from Helmets

Most countershaft and lineshaft bearings in industrial establishments must be



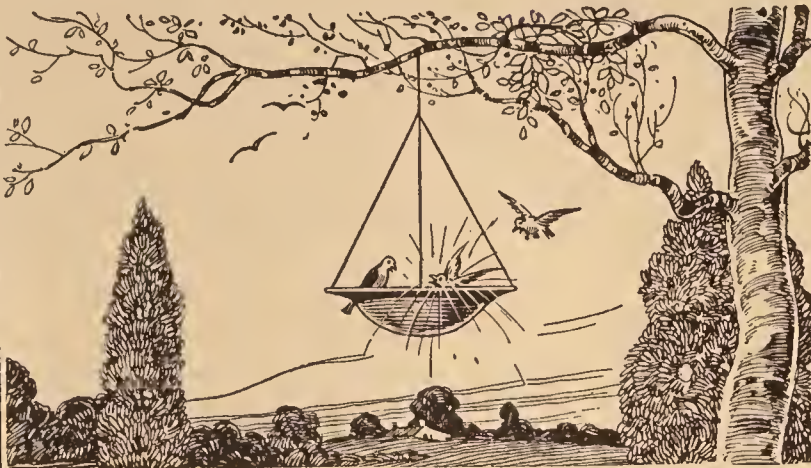
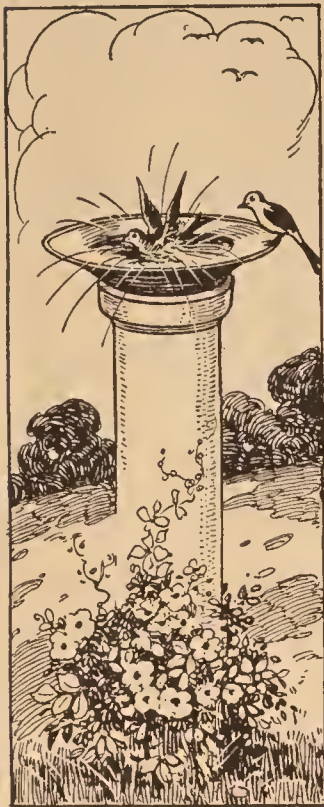
Trench Helmets, Suspended under Shaft Hangers to Receive Oil Drippings from the Bearings, Make Rigid and Neat-Appearing Oil-Drip Pans of Ample Capacity

fitted with an oil-drip pan of some kind to prevent the oil from dripping over whatever might be underneath. These drip pans are of every type and character, most of them so flimsy and of such insufficient capacity that they are little better than worthless. Evidently, the winner of the second prize, W. E. Swanson, of Weehawken, N. J., had in mind these facts when he submitted his idea, which is illustrated herewith. Four holes are drilled in the rim of the helmet and stiff wires are inserted and hooked around the shaft hanger, resulting in a singularly rigid and neat-appearing drip pan of ample capacity.

Trench Helmets Used for Bird Baths

Truman R. Hart, winner of the third prize in the contest, lives in Ashtabula, Ohio, and his idea utilizes surplus helmets for bird baths, suspended from the branches of a tree, or mounted upon a pedestal. In the latter case, an 8-in. sec-

tion of drain tile is used for supporting the water-filled helmet. If the bath is to be suspended from a tree, as illustrated, three or four wires will be needed, for

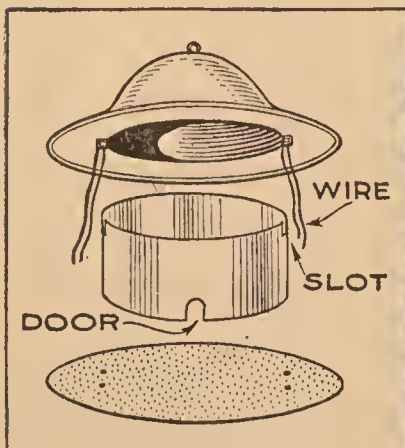


Trench Helmets Mounted on a Pedestal of Eight-Inch Drain Tile, or Suspended from the Branches of a Tree, Provide Our Feathered Friends with Bathing and Drinking Facilities

which holes must be drilled through the rim, but if means for drilling are not at hand, a wire ring an inch or so less than the diameter of the helmet, may be placed about it, and the suspension wires hooked or soldered to the ring. This idea, as well as the one described as the winner of the fourth prize, can be utilized by school-boys and others as a means of making extra money, by making and selling bird baths and houses of the type described. A small wooden block should be placed in the bottom of the bath, so that the birds may perch upon it.

Bird Houses Made from Helmets

The fourth prize was won by the idea submitted by Geo. A. Stephen, of Ottawa, Ill., describing the construction of a bird house, using a trench helmet, as shown in the photograph and drawing. The strap and cushion are removed from the helmet. A wire loop, or ring, is placed through the hole in the center of the crown. The base is cut from a piece of galvanized iron, upon which the outline



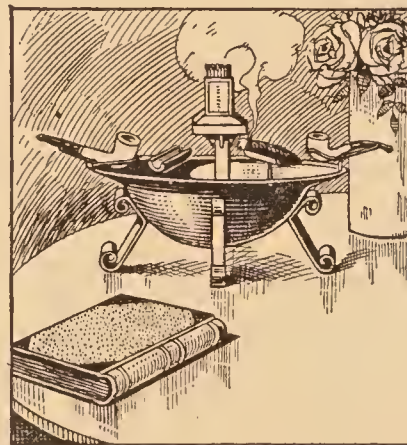
A Trench Helmet Utilized to Make an Attractive and Substantial House for Wrens and Other Small Birds

of the helmet has been traced. A 5-in. length of 8-in. furnace pipe is placed in the helmet, and slots are cut on opposite sides so as to allow it to pass the metal strap loops. Next the arched door is cut on the lower edge of the piping. If intended as a wren house, a hole the size of a quarter is large enough. Two 15-in. pieces of wire are placed through the strap loops and bent at the center. Four holes, two on each side, are punched through the base, and the ends of the wire are inserted, being brought together and twisted or tied as neatly

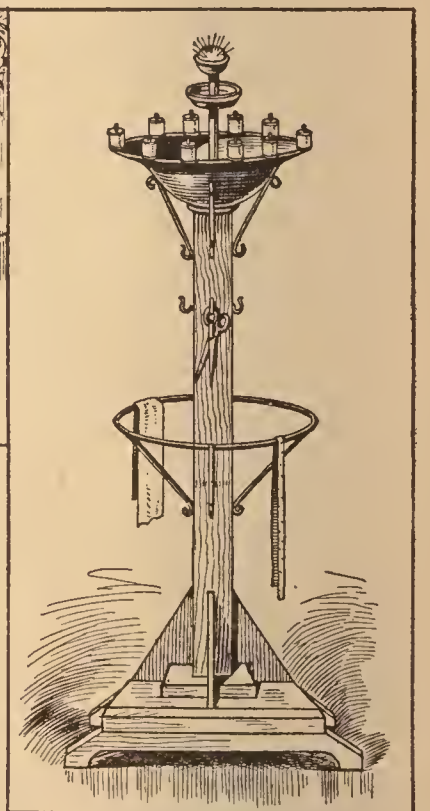
as possible. Bird houses should be put out in the fall, in order that the earliest arrivals will have accommodations and so that there will be no odor of paint left.

Smoking and Sewing Sets from Helmets

Coming from outdoors into the home, the two ideas submitted by Geo. H. Cappel,



The Smoking Set, at the Left, and the Sewing Stand, at the Right, Both Make Use of Trench Helmets as Their Most Important Element

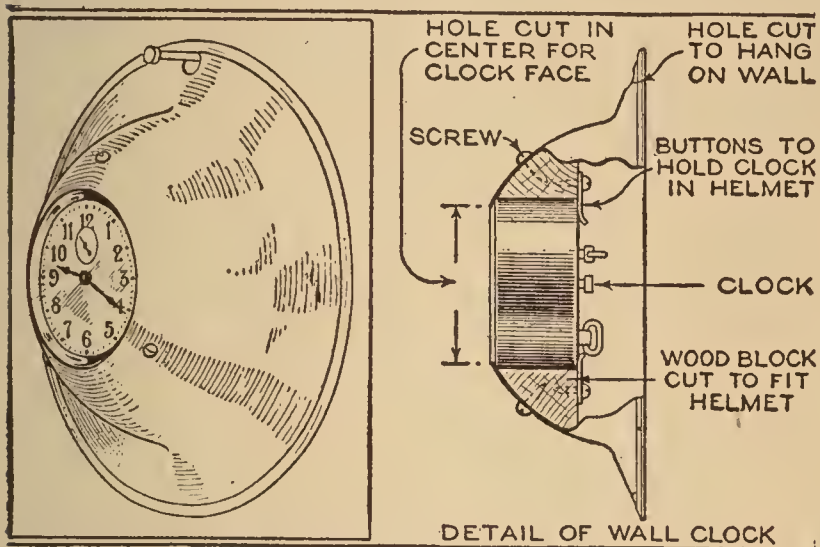


Wilmer, Ala., a smoking set and a sewing stand, shown in the drawings, are very useful. In the former, the helmet is supported by four wrought-iron legs, riveted to the sides, a matchbox holder being riveted to the center of the crown, and appropriate holders for pipes and cigar to the rim. The sewing stand is built somewhat along the same lines, with the difference that the helmet is supported on a wooden pedestal. Rising from the center of the helmet is an upright piece that holds a pincushion and tray for pins. Short lengths of rod are riveted around

the outside of the rim as holders for the different colors and sizes of thread.

A Trench-Helmet Clock

Properly finished, the trench-helmet-clock idea submitted by V. N. Perry, Buffalo, N. Y., makes an effective and attractive wall ornament, although considerable work is necessary to cut the hole through the crown, unless a lathe or milling machine can be used. After a hole of a diameter sufficient to accommodate the clock is obtained, a wooden block is made to fit inside the helmet and fastened with two or three screws. A hole is bored through the block large enough to

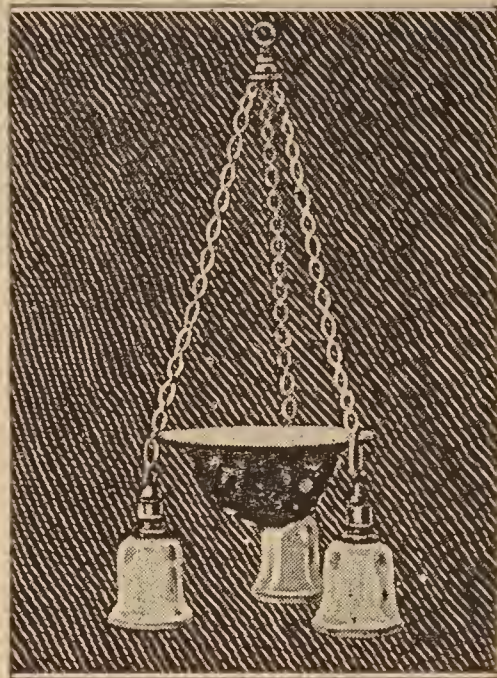


An Effective and Attractive Wall Clock Made from a Trench Helmet: A Hole is Cut in the Crown and a Block of Wood, Bored to Fit the Clock Used, Screwed to the Inside of the Helmet

allow the clock to slip in easily, where it is held in position with metal buttons.

A Trench-Helmet Lighting Fixture

Fred C. Bass, Fernie, B. C., did his stretch in the army and retains his "Carnegie derby" as a souvenir of his experiences, by converting it into the attractive electric-lighting fixture shown in the photograph. The outside of the helmet was polished as smoothly as possible and about 40 cap, collar, and shoulder de-



devices, representing the many regiments of the American and Canadian forces, were soldered all over the crown. A row of large-sized coat buttons was soldered around the outer rim of the helmet. The outside was given a coat of gold bronze, and the inside was treated with white enamel to reflect the light rays from the electric lamp concealed within the helmet. A canopy and metal chains to suspend the fixture from the ceiling, together with three sockets and shades that are supported by the lower ends of the chains, complete a very fine piece of work.

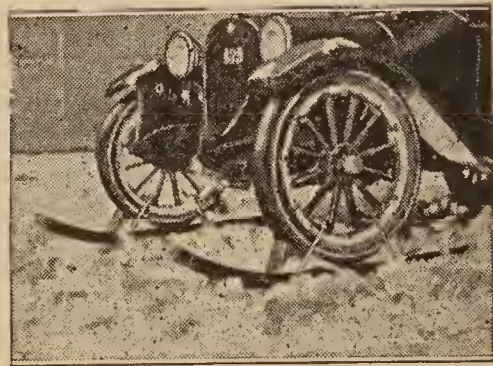
Flattening Warped Phonograph Records

Phonograph disk records are sometimes warped when bought, or become warped afterward, with the result that the undulations of the tone arm cause an unpleasant grating noise or excessive wear on the record, and often, in extreme cases, a noticeable rise and fall in tone.

To flatten the record and correct these conditions, place a sheet of plate glass upon the record and expose it to the sun. The glass should be large enough to cover the record completely. If the glass seems too light, place small weights about the edge so that the pressure will flatten the record when the sun's warmth begins to soften the composition. The length of time needed to expose and flatten a record will vary, of course, with the condition of the record and the heat of the sun. However, it should not be exposed too long. If done carefully, the sound grooves will not be damaged.—C. M. Adams, Milford, Ohio.

An Auto on Runners

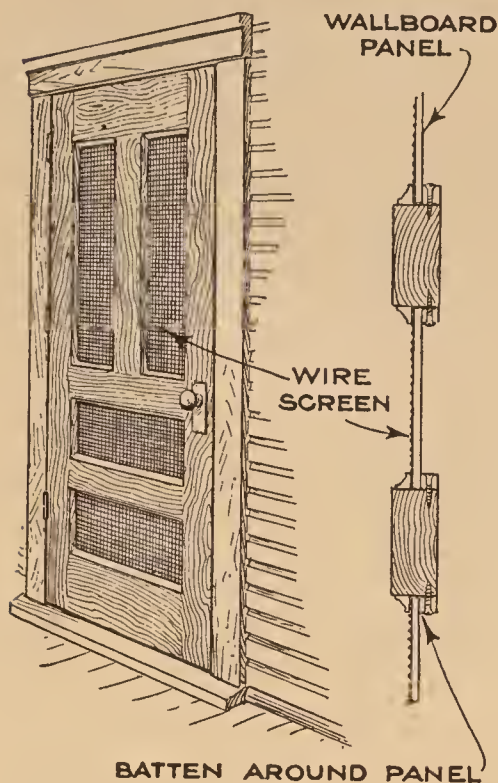
A combination of automobile and sleigh, for traveling on hard-packed snow and ice, is made by the addition of a set of runners to the front wheels of the car, as shown in the photograph.



The runners are bent from hardwood of suitable thickness and of the same width as the diameter of the tires. Triangular blocks, in front of and behind the wheels, prevent any movement when the runners are clamped in place by means of the bolts shown. Skid chains are necessary on the rear wheels in order to obtain the maximum amount of tractive effort.—Dick Greenwool, Prince Rupert, B. C.

Storm Door from Screen Door

Instead of taking the screen doors down for the winter, the wire screen can



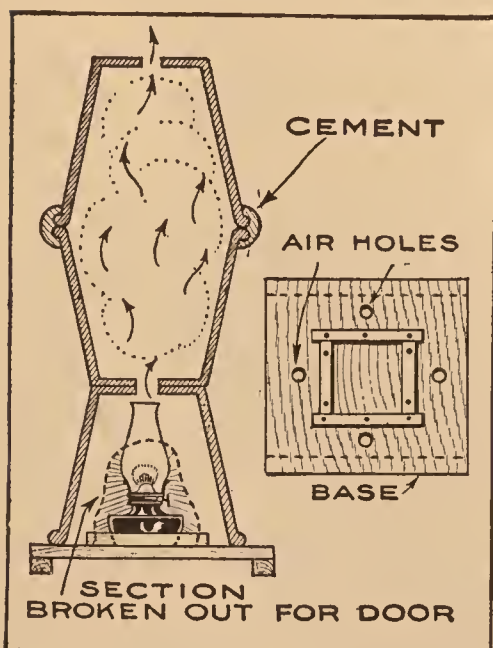
be given a coat of paint to protect it from rust and used to make a cheap storm door.

The drawing shows how the storm door is made, by using wallboard panels that are held against the screen wire by battens, or strips fastened to the

woodwork of the door. The wallboard should be painted on both sides to protect it from moisture. Before adding the panels to the door it would be well to add an extra pair of hinges to bear the additional weight of the wallboard.—J. Arthur Stevens, East Boothbay, Me.

Small Heater from Flowerpots

A small heater that is quite effective for removing the chill from a room and which may even be used, with proper precautions to prevent fire, to keep the temperature of a small garage from falling too low, is shown in the illustration.



A square board is provided with cleats to hold a kerosene lamp on its center. Several holes are drilled around

the center to admit air, without which the lamp cannot burn; the base is supported above the floor by strips nailed on opposite sides. Two large clay flowerpots are placed top to top, and the joint is closed with cement or plaster of Paris. A third flowerpot is used as a lamp housing, and

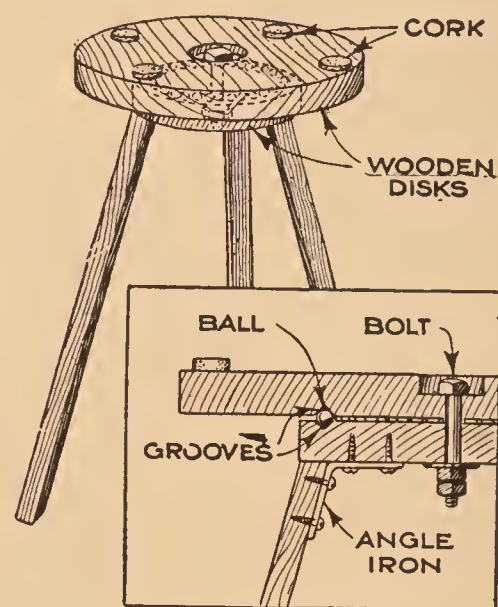
a section can be broken away in it to permit regulation of the lamp. The assembled heater appears as shown in the drawing.

Asbestos Protects Auto Hood

Owing to the high degree of heat to which an automobile-engine hood is subjected, the finish deteriorates rapidly, and in some cases, the unequal contraction and expansion of the metal and the paint cause the latter to chip and flake. This trouble can largely be prevented by lining the hood with asbestos paper, using shellac to hold the paper to the metal. The hood is opened up as flat as possible and one or more thicknesses of paper pasted onto the underside.—Dale R. Van Horn, Lincoln, Neb.

A Revolving Carom-Board Stand

Players of carom, who are familiar with the disadvantages of moving from one



position to another and turning the board around so as to enable them to make a good shot, will appreciate the points of the revolving stand illustrated.

The drawing is practically self-explanatory and shows a three-legged stand, in the top of which is a circular V-shaped groove, that serves as a ball race for a number of hardened steel balls. The larger disk that rests upon the balls revolves about a bolt passing through its center and the top of the stand. Holes are drilled near the edge of the revolving disk and corks inserted, the friction of which prevents the board from being easily disarranged.—Lester A. Hitchcock, Kewanee, Ill.

To Render Paper Translucent

To make paper translucent, and give it the appearance of parchment for making lamp shades, make up a mixture of paraffin oil, turpentine, and raw linseed oil. This is applied to both sides of the paper with a tuft of cotton.—Geo. L. Emerson, Chicago, Ill.



UTILIZING NEW STEEL TRENCH HELMETS

Fruit Dish, Poultry Nest, and Umbrella Stand Made from Helmets

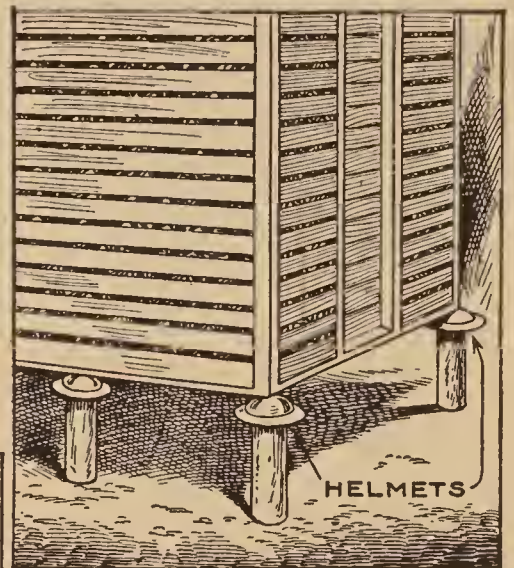
The three ideas illustrated in the large drawing, the fruit dish, poultry nest, and umbrella stand, were submitted by J. V. Romig, of Allentown, Pa.

The fruit dish is supported on feet, about 1½ in. long, turned from brass rod. These feet are inserted into holes drilled through the helmet, and riveted, the finished article being decorated in any desired manner, and then lacquered.

Parasites that infest wooden nest boxes refuse to have anything to do with metal nests. Consequently, by mounting trench helmets in the manner shown, the general condition of the flock will be improved. The steel nests are indestructible, and, having no corners or crevices, easily cleaned.

A trench helmet will make an admirable drip bowl for an umbrella stand. The frame is made from ½-in. pipe and fittings, of polished brass, nicked brass, copper, or painted iron. Holes are drilled in the rim of the hel-

met to slip over the pipe standards, where it is held in place with cotter pins. The small hole in the center of the crown may be plugged, so that, by removing the plug, water from the dripping umbrellas can be



Rats Kept Out of Corncrib by Helmets Nailed on the Posts

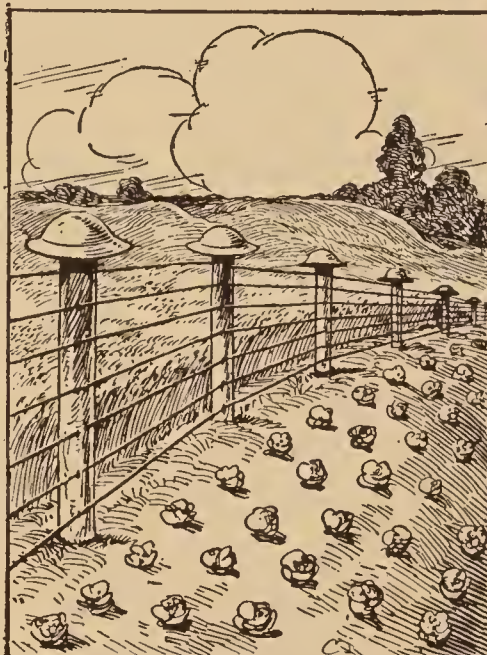
drained off without removing the helmet.

Helmets Keep Rats Out of Corncrib

Truman R. Hart, of Ashtabula, Ohio, who won the third prize of the contest with his idea of utilizing helmets for bird baths, also contributed another plan that makes use of them for keeping rodents and other vermin out of corncribs and similar elevated storage bins. The idea involves nothing more complicated than capping each of the supporting posts with a trench helmet that has been drilled with two or three holes so that spikes can be driven through the plate into the post.

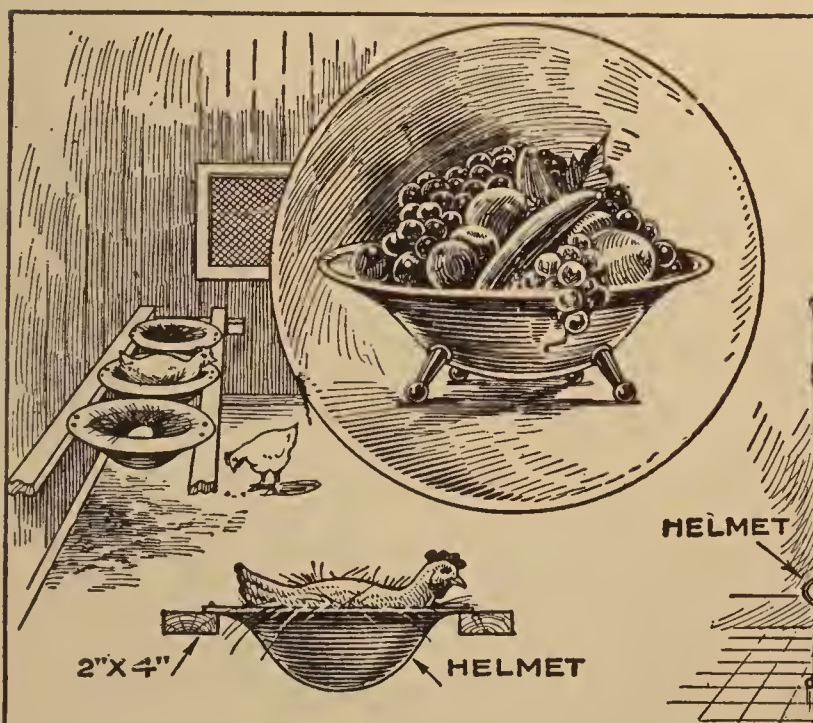
Fenceposts Preserved by Helmets

From saving the lives of soldiers on the battlefield, the trench helmets have been adapted by R. C. Leibe, of Chase



Helmets on Fenceposts Prolong Their Life

for keeping rodents and other vermin out of corncribs and similar elevated storage bins. The idea involves nothing more

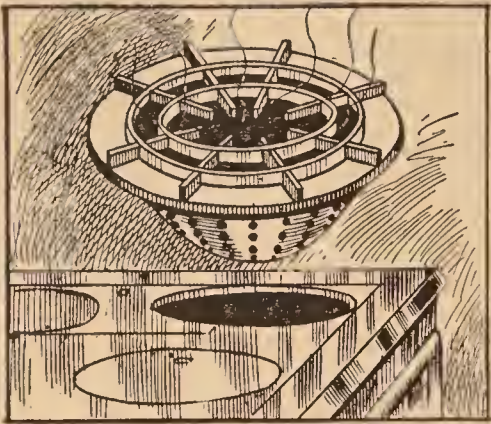


At the Left, the Helmets are Shown in Use as Sanitary Nests; in the Center, as an Attractive Fruit Dish; and at the Right, as a Drip Bowl for an Umbrella Stand

City, Va., to prolonging the life and usefulness of fenceposts on the farm. The drawing shows how each post is surmounted by a helmet that is held in place with a long spike. Naturally, this protection prevents water, that would cause the post to check and split within a comparatively short number of seasons, from coming into contact with the exposed end.

Trench Helmet as Charcoal Brazier

A rather original idea in which a trench helmet is used as a charcoal brazier in the kitchen stove during the heat of summer, is the contribution of Roland B. Cutler, of Springfield, Vt. The crown of the helmet is perforated with $\frac{1}{4}$ -in. holes to permit circulation of air through the burning charcoal that is placed inside. In use, the helmet is set into one of the openings of the kitchen stove, and a grid from an oil or gas stove, resting upon a plate fastened to the rim, completes the arrangement.

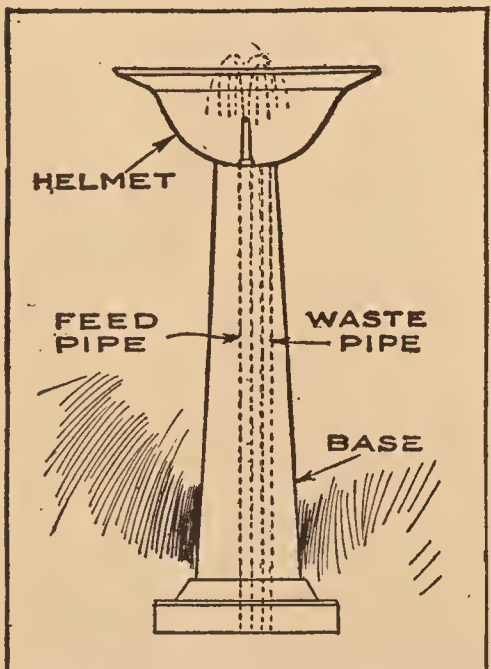


This Brazier will be Found Very Effective during the Summer

tation of air through the burning charcoal that is placed inside. In use, the helmet is set into one of the openings of the kitchen stove, and a grid from an oil or gas stove, resting upon a plate fastened to the rim, completes the arrangement.

A Helmet Drinking Fountain

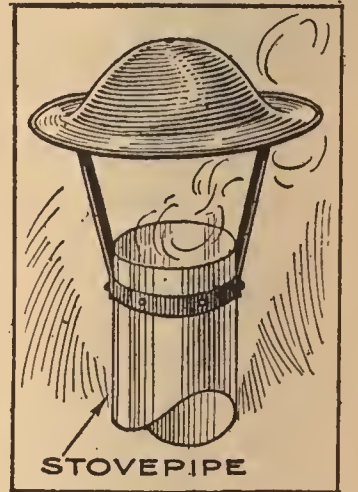
From New Hartford, N. Y., Floyd A. Krenzer submitted his idea for making a sanitary drinking fountain, using the trench helmet as a receptacle for catching the waste water. The water-supply pipe, with a suitable nozzle at its upper end, comes through the center of the crown, while the overflow is carried off by a waste pipe that is arranged a little to one side of the center. The fountain is mounted on a pedestal, that can be made to correspond with its surroundings; in some instances, it might be found preferable to mount it on wall brackets.



A Helmet Makes an Effective Drinking Fountain

Helmet for Stovepipe Cap

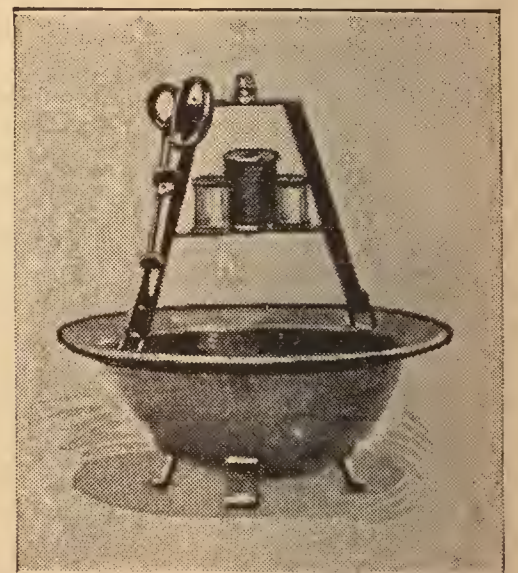
To prevent rain from blowing down a stovepipe chimney and causing it to rust to pieces rapidly, Anthony Jacobucci, Philadelphia, Pa., suggests that the army trench helmet be used as stovepipe caps in the manner shown in the drawing. A strip of flat, stiff iron is riveted around the stovepipe as a reinforcement for helmet-supporting braces, which are riveted to it and the helmet. Not only does a cap of this kind prevent entrance of rain, but, as the helmet is somewhat larger in diameter than the stovepipe, there is slight possibility of a down draft blowing the smoke out into the room below.



A Helmet Cap on the Stovepipe Prevents Rust and Down Draft

A Neat Sewing Stand

Arthur Gulbranson, of Chicago, Ill., has fashioned from a trench helmet a very substantial addition to the sewing equipment of the feminine portion of his family. As the photograph shows, feet, of $\frac{1}{8}$ by 1-in. annealed brass strips, are riveted or soldered to the crown of the helmet. A combined spool rack and scissors holder, of the same material, is soldered in place, $\frac{3}{8}$ by $\frac{7}{8}$ -in. brass pins being soldered to the crossbar to hold the spools. This crossbar has small projecting ears passed through slots in the side-pieces, soldered in place, then scraped bright. A clip and socket for the scissors are also soldered to one of the side-pieces, and a small brass pin, soldered to the top of the rack,



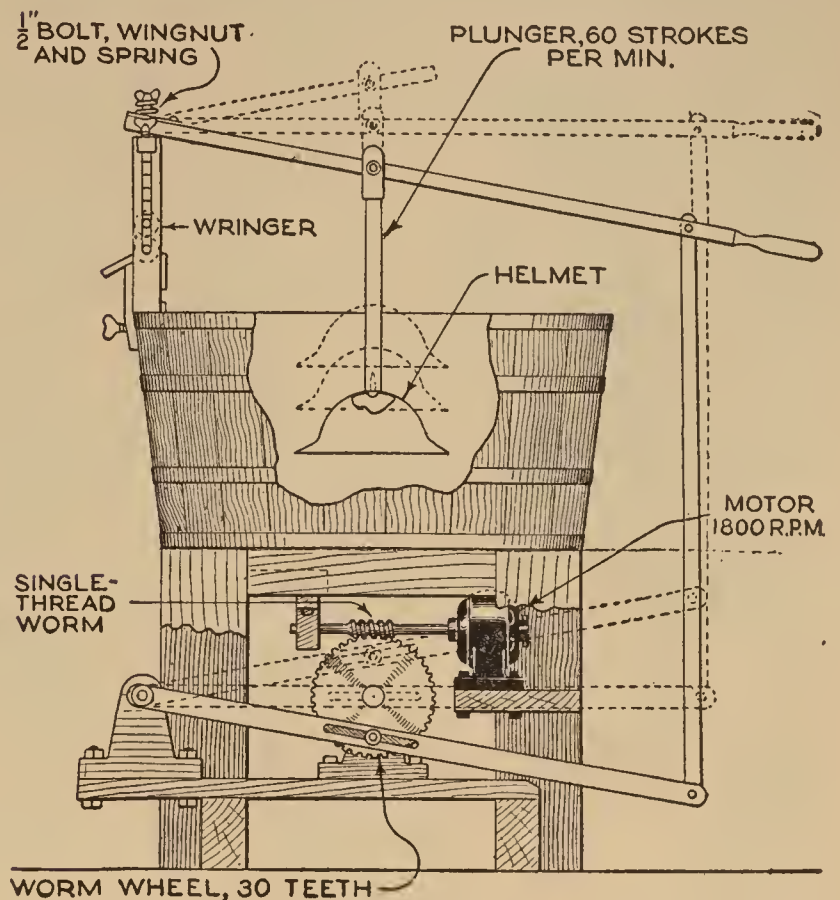
A Substantial and Attractive Helmet Sewing Stand

makes a convenient holder for a thimble. The helmet and fittings were rubbed to a high polish with fine emery cloth and then lacquered, completing a very useful and substantial piece of work.

Trench-Helmet Washing Machine

A washing machine that can be operated by hand, or driven by electric motor, is the plan of Edwin J. Bachman, of Fullerton, Pa. He already has the hand-power machine in successful operation but plans to "motorize" it, so that it will be driven by a $\frac{1}{4}$ -hp. electric motor. The hand-power machine is simplicity itself and consists of nothing more than a lever to which the trench-helmet vacuum plunger is attached. The hand lever is fastened to the top of the wringer by means of a bolt, wingnut, and spring, while the plunger with the trench helmet attached to its lower end swings freely on the hand lever, so that the former is always in a perpendicular position. If electric current and a $\frac{1}{4}$ -hp. electric motor are available, it requires but little additional effort to make the motor do the work by following the arrangement shown in the drawing, the most important part of which is the gear and lever arrangement for reducing the speed of the motor and transmitting the motion to the helmet. The lower lever is slotted to fit over a crankpin in the larger gear; the center of the worm wheel must be directly below the center of the helmet, and the pivots on the slotted lever directly in line with those on the hand lever. Then, with the pin in the worm wheel 2 in. off center, the

stroke of the plunger will be 4 in. It will be observed that with such an arrangement there will be more or less swinging

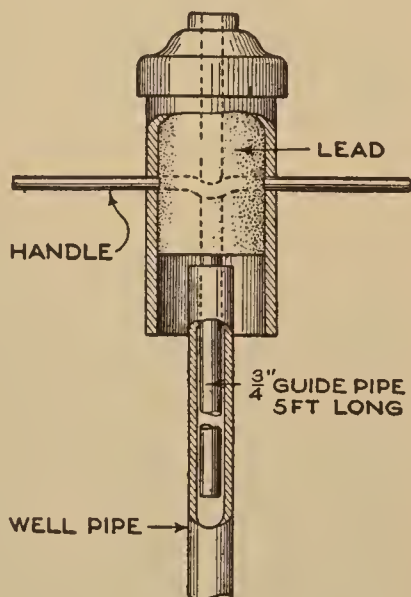


A Helmet Used as a Vacuum Plunger for a Washing Machine: The Drive Shown Is Only a Suggestion, and may be Modified in Any Desirable Way

of the plunger, whether operated by hand or power, but this is desirable because it permits the plunger to come down at a different point in the tub at almost every stroke.

Driving Well Pipes

Where water at slight depths below the surface is found suitable for household purposes, the most practical and inexpensive method of sinking a well consists in driving a screened drive point into the earth. After boring a few feet below the surface, place the pipe, with the point attached to the lower end, in the hole, and drive it down until the flow of water is reached.



In order to drive the point to the desired depth, much care is needed to avoid injuring the pipe threads. To make the work simple, and a one-man job, the hammer shown in the drawing can be used with excellent effect.

The $3\frac{1}{2}$ -in. diameter brass shell of an old pump cylinder was obtained, although a similar piece of pipe with a cap over one end will answer as well. Holes were drilled through opposite sides, large enough for a piece of $\frac{3}{4}$ -in. iron rod to serve as a handle. A piece of $\frac{3}{4}$ -in. pipe, about 5 ft. long, was screwed into the cap on the end of the pump cylinder, as in the drawing. The hammer was weighted by filling the interior with 12 lb. of melted lead. In use, the pipe guide is inserted inside the well pipe, and the hammer is lifted and allowed to drop, forcing the point deeper into the earth at each stroke. —Geo. G. McVicker, North Bend, Neb.

Typing to the Bottom of Sheets

When typewriting on postcards and envelopes, one often has occasion to write to the very bottom, but finds this impossible because the work slips out from under the feed roller. This trouble can be overcome, in most instances, by attaching the upper edge of the work to a somewhat larger sheet, with paper clips.

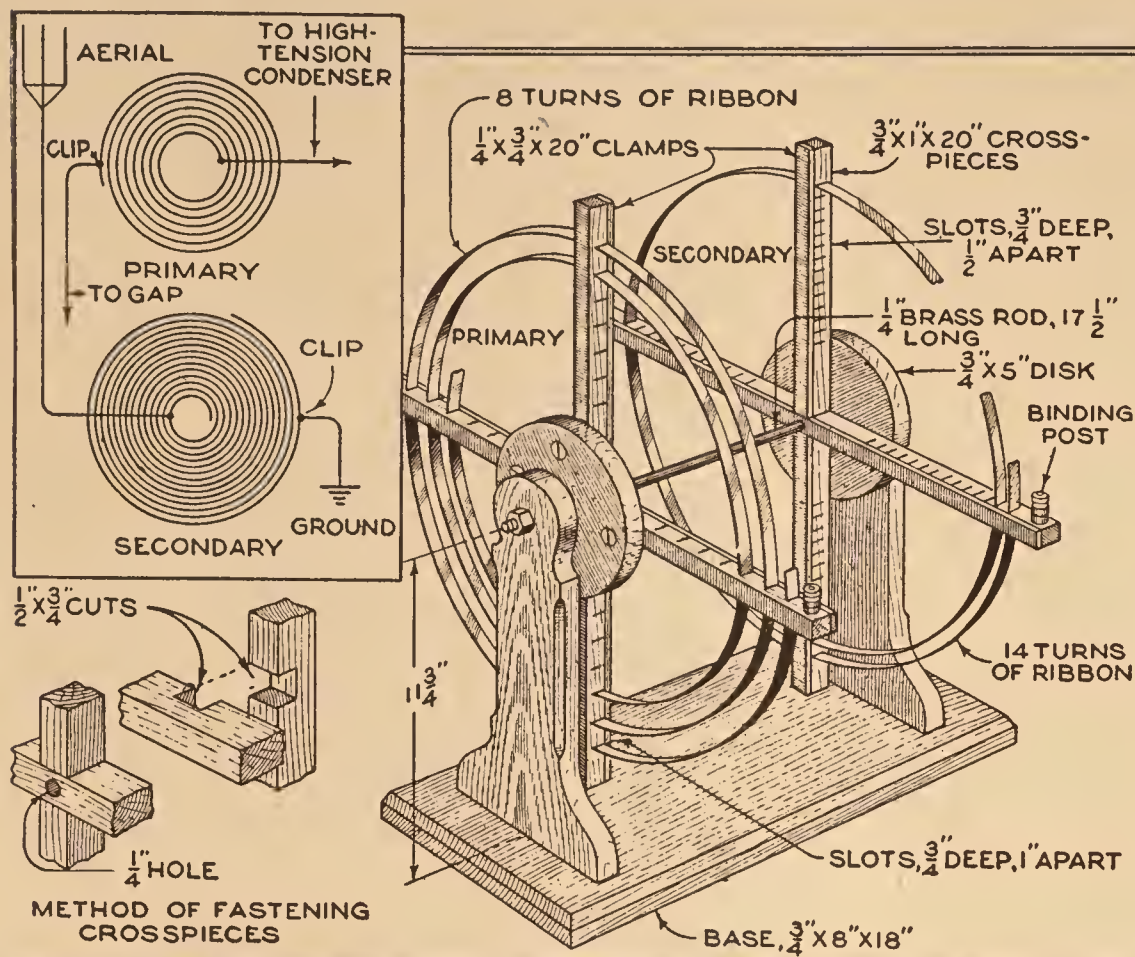
An Oscillation Transformer

The oscillation transformer is an important part of an efficient radio-trans-

without undue heating at the gap, as experienced with the old-style helix. The pancake transformer has made possible some remarkable records in amateur stations and nearly all of the record holders use it.

The woodwork may be any variety of wood, stained and finished to the satisfaction of the maker; poplar or birch will be found easy to work, and will take a mahogany finish well. The base and uprights are cut to the dimensions given, and assembled with $1\frac{3}{4}$ -in. wood screws, driven through the bottom of the base. The brass rod is threaded and provided with a washer and nut at each end. Two wooden disks are screwed to the back of both primary and secondary crosspieces with 1-in. screws, and the crosspieces are slotted to take the required number of turns of ribbon.

This ribbon may be of either copper or brass, about $\frac{1}{16}$ in. thick by $\frac{3}{4}$ in. wide; it may be made up from a number of short pieces soldered together, or bought in one length, from any dealer in radio supplies. Clamps, in the form of light wooden strips, for holding the turns in place are fastened over the slots, so that there is no possibility of the ribbon working out of position. A binding post may be used at each outside ribbon terminal if desired, the lead wires to the condenser and aerial being soldered to standard helix clips, or clips can be used at all points. The clips from an old knife switch make ideal contacts.—F. L. Brittin, Chicago, Ill.



A Simple and Easily Made Oscillation Transformer, of the So-Called "Pancake" Type: All Material, with the Exception of the Ribbon, can be Picked Up around the Radio Laboratory

mitting set, and there are many types on the market; the best kind, for all practical purposes, however, is the so-called "pancake" type. This transformer is simple to make and inexpensive. The advantages of this type of transformer over the helix type are many, as it permits either direct or inductive coupling, insures a pure and sustained wave that can be sharply tuned at the receiving station, and cuts out interference. All parts of the winding are accessible to the clips, the primary and secondary slide along a horizontal brass rod that makes quick changes in coupling possible, and the full energy of the transmitter can be utilized

mushroom-shaped heads caught a firm hold in the cement. As a tube-patching fixture, a motorist inserts the stem of an old valve into a hole in his workbench. The tube to be patched is placed over the convex head of the valve, and the patch is made in the usual manner. In another instance, a similar valve was converted into a tail-lamp bracket by bending and threading the stem and drilling holes through the head so that the fixture could be bolted to the car; the head, in this case, was ground flat.

Using Old Engine Valves

Gas-engine valves, with bent stems or warped heads, can frequently be salvaged from the scrap pile and put to further use for other purposes. Recently, in placing a concrete garage floor, the metal channel in which the doors slid was bolted down by imbedding a number of old valves in the plastic concrete, head down; of course, lining them up with the holes in the channel and threading the stems. These served as efficient anchors, as the

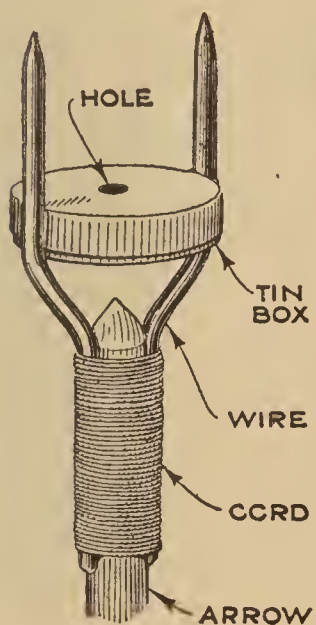
Waterproofing Rope Clotheslines

In order to make a rope clothesline waterproof and resistant to atmospheric influences, treat it in the following manner: Make two separate solutions, the first consisting of 1 lb. of soap dissolved in 5 qt. of water; the second is made by dissolving 1 lb. of ordinary alum in the same quantity of water. The soap solution is heated to about 120° F., and the rope immersed in it until the fibers have been thoroughly soaked; it is then removed, wiped free of superfluous solution, and transferred to the alum bath, in which it is allowed to remain for about 30 minutes, then taken out, and the excess solution wiped off.

This process impregnates the fibers of the rope with a soap that is insoluble in cold water, making it quite waterproof.

A Whistling Arrow

An arrow that will give a sharp and piercing whistle, when shot into the air, the tone rising and falling with the speed



of the missile, is made as shown in the drawing. Two stout-wire prongs are bent as indicated and tightly bound to the shaft, the distance between the points being about 1 in. A small round tin box, of corresponding diameter, is obtained, and a hole, about $\frac{1}{8}$ in. in diameter, is drilled through the center, care being taken to remove any burs or rough edges that might be around the holes. The box is placed between the prongs, to which it is held by soldering.—A. R. Mutton, Waterloo, Ia.

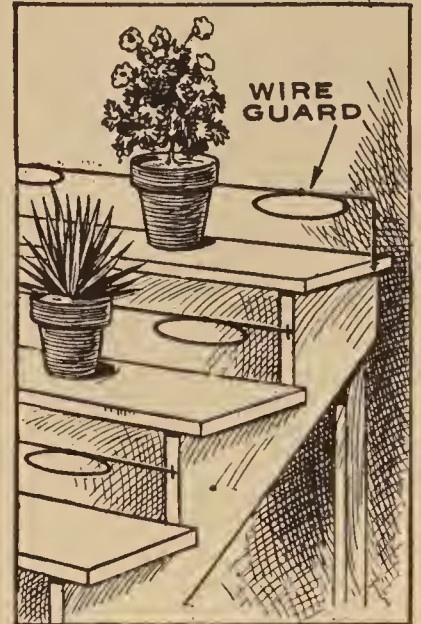
Hanging Pictures Straight

When framed pictures are always getting crooked, the appearance is far from pleasing, and the effect is annoying. To overcome this "shiftiness" of pictures, first hang the picture with its face to the wall. Adjust it so that it is hanging perfectly straight and then turn it around. The single twist in the cord or wire is usually sufficient to prevent it from slipping on the nail or hook from which it is suspended.

Guard for Flowerpot Stand

When flower stands that support potted plants are exposed to sudden gusts of wind, the plants are often blown from the shelves, with consequent damage to the plants and pots, and, also, in some cases, to the surroundings.

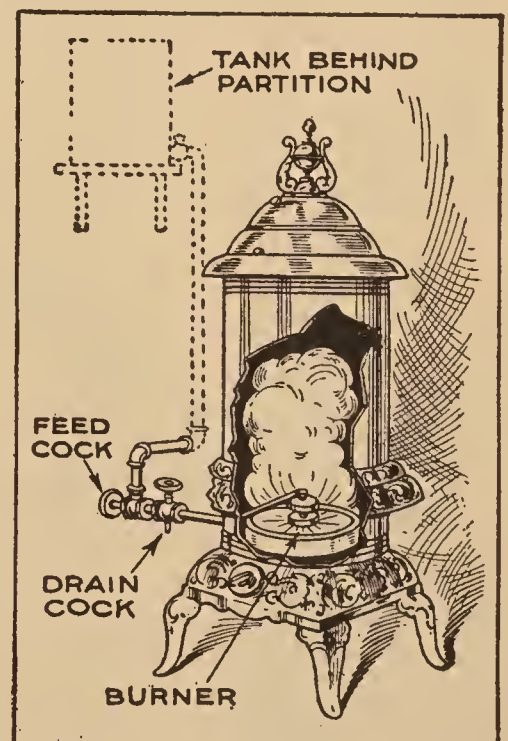
The drawing shows a neat and safe method of preventing the plants from being easily displaced. A piece of stiff iron wire has a number of loops formed in it, the ends being attached to the stand at such a height that the loops will fit the pots just underneath the shoulder.—Truman R. Hart, Ashtabula, Ohio.



An Oil-Burning Coal Stove

A resident of the Pacific coast, having on hand a kerosene burner and fuel tank, changed his wood and coal heating stove into an efficient oil-burning heater with but little trouble or cost. A burner, which was of

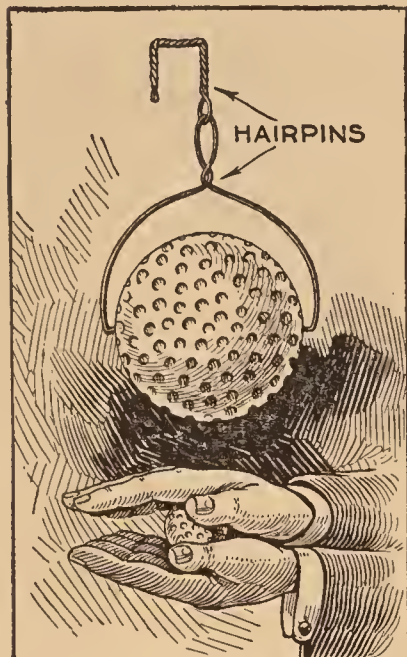
the vapor type, with a disk above the flame, to deflect it horizontally, was set on the stove grate. A hole was then drilled through the side of the stove to admit the fuel-supply pipe. As the heater was used in the dining room, the feed pipe



was passed through the partition into the kitchen and connected to the tank, which was supported on a shelf, as indicated in the drawing. A "gooseneck," made in the stovepipe by the use of four elbows and short lengths of pipe, permitted the escape of odors while reducing the waste of heat ascending the chimney.—Edwin M. Love, Alhambra, Calif.

Refinishing Old Golf Balls

After being driven around the links for a few weeks, a set of golf balls takes on a

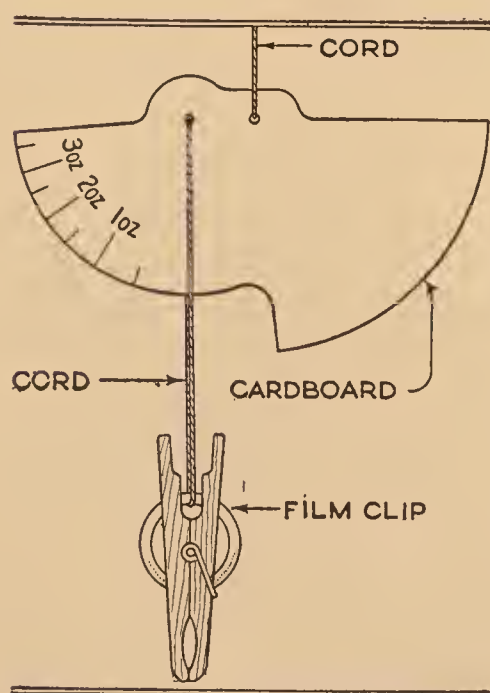


rather dilapidated appearance, making them not only unsightly, but more difficult to find in the "rough." To remove the old enamel, soak the balls in a solution of two teaspoonfuls of lye to a pint of cold water until the paint is easily removable. Wash thoroughly in several changes

of cold water, and allow to dry. To repaint the balls, a small amount of golf-ball enamel is poured into the palm of the hand, and the balls are rolled as indicated in the drawing. The balls can be suspended while drying without coming into contact with anything, by means of the wire hanger shown in the drawing, which is formed from ordinary wire hairpins.—H. H. White, West Baden, Ind.

A Simple Postal Scale

The scale illustrated is made from a piece of stiff cardboard, about $\frac{1}{16}$ in. in



thickness, and is designed to weigh letters and similar light objects up to 3 oz. The radius of the segment on which the scale of weights is lettered is 3 in., and that of the larger balancing segment is 4 in.; the suspension points are $\frac{1}{2}$ in. apart and are formed

at the centers from which the arcs are described. The suspended film clip can be quickly snapped onto the article to be weighed, the action of the scale being similar to the old-fashioned steel-yard. Any light clip will serve for the purpose. The various weight divisions on

the scale can be found by using small weights of known value, suspending them from the clip and graduating the scale according to the position of the string on the scale.—Harry W. Poor, Boston, Mass.

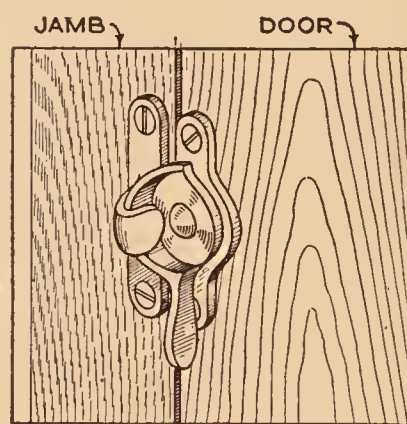
Removing Negative Scratches

Sometimes a scratch will appear on the "glass" side of a photographic negative, directly over the face, or some other important detail of the image.

To remove such scratches, a little of the finest emery flour is mixed with alcohol to the consistency of thick paste; this is rubbed over the scratch with a piece of flannel. In a very short time the scratch will have disappeared, leaving the glass smooth.

Window Sash Lock for Doors

An excellent device for locking a door from the inside, that is as effective as the



old reliable bolt or chain, is made from an ordinary sash lock, as shown in the drawing. The lock is fitted to the door, with the catch mounted on the jamb, as illustrated; if additional security is

wanted, two such locks can be attached, one a foot from the top, the other a foot from the bottom of the door. Such a lock can also be usefully applied to the doors of refrigerators and cigar cases, which must be kept tightly closed.—Charles Anderson, Chicago, Ill.

Starting Car with Shorted Ignition

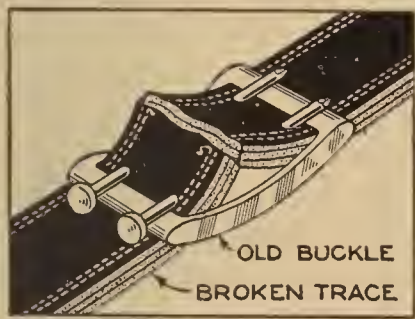
If an automobile of a certain popular type is left unprotected during a rain-storm, water will leak down back of the dash and short-circuit the ignition, making it impossible, in most cases, to start the engine. This short-circuiting is caused by the damp wood which permits the ignition current to pass through it with more or less freedom. However, unless the wood is very thoroughly soaked, the auto can usually be started without waiting for a service car with an extra coil box.

Take all the coils from the coil box and wipe both the coils and box as dry as possible; then remove all the spark plugs and shorten the gap between the elec-

trodes until it is no greater than the thickness of a piece of paper. After replacing the plugs, the motor may be started, if it can be started at all. Most owners being thus caught for the first time will crank violently for some time with no result and conclude that the engine will not start until the ignition system has dried out. However, shortening the spark gaps makes it easier for the spark to jump across there than go through the wet wood, and many cars started in this manner have fired on all cylinders, where not a single explosion could be obtained before. The gap may be increased after the wood has dried out, as the short gap will not fire the mixture as satisfactorily as the spark of correct length, although it is better than no spark at all.—Harold E. Benson, Boulder, Colo.

A Simple Harness Repair

The drawing shows a simple method of repairing a broken harness strap or trace; one that will hold until the proper kind of a job can be done by sewing or riveting. As indicated, the ends of the straps are brought together inside an old buckle, and two nails are driven through the leather, with their ends bearing against the buckle. A steel harness ring can be used in the same manner, provided the nails are long enough to permit their ends to rest on the ring.—Chas. Black, Hightstown, N. J.



Making Pump Valves Tight

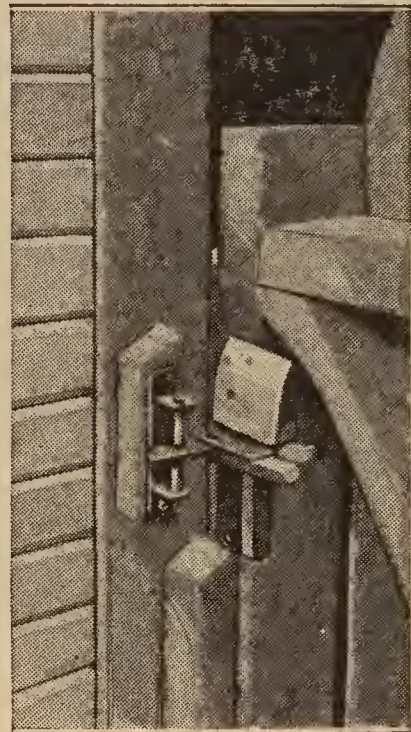
A simple and effective way to tighten permanently the taper-valve holder, or box, in certain types of hand pumps, is found in the use of ordinary rubber cement.

The treatment is simple and requires that the bottom box be removed and the leather covering permitted to dry, after which it is given a coating of rubber cement, which is left to dry for about a half hour. Apply successive coatings until a fairly thick layer of rubber has been applied to the leather covering. This treatment provides a thin rubber gasket that will not only hold the box tightly when replaced, but will prevent water from leaking between it and the pump barrel.—Wm. S. Jacobs, Auburn, N. H.

A Sag-Proof Gate Latch

It is difficult to build a gate that will never sag, or that will not expand and contract with changing temperatures, but it is perfectly feasible to fit the gate with a latch that works just as well in spite of the sag, contraction, or expansion.

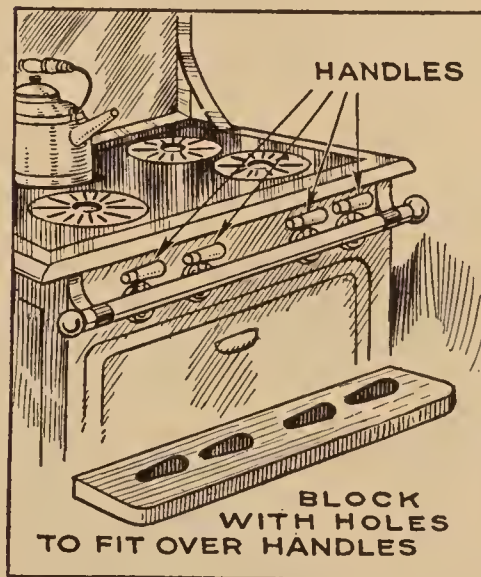
The gate latch shown in the illustration hooks over a pin, 2½ in. long, placed vertically and held at each end by suitable sheet-metal brackets. The gate may sag, expand, and contract freely; so long as the latch does not move beyond this 2½-in. range, the operation of opening and closing the gate is not interfered with.—Curtis Ralston, Springfield, Ohio.



Lock for the Gas Range

There is always danger of having burners on the gas range turned on by some

small child who is not old enough to realize the gravity of the act. To remove temptation from young fingers, a simple lock may be made from a strip of hardwood, a few inches longer than the distance



occupied by the set of valve handles. Holes are cut in this wooden strip corresponding to the outline and position of the handles. When the stick is in place, the pipe in front of the handles prevents a child from getting at it easily, even though the habit of tampering with the burners and valves has been learned. The hardwood stick should be thick enough to prevent any of the valves from being turned when it is in place. If the stove has round valve handles, the holes are, of course, shaped accordingly.

An Emergency Auto Jack

A stick of cordwood can be made to serve as an automobile jack when tire



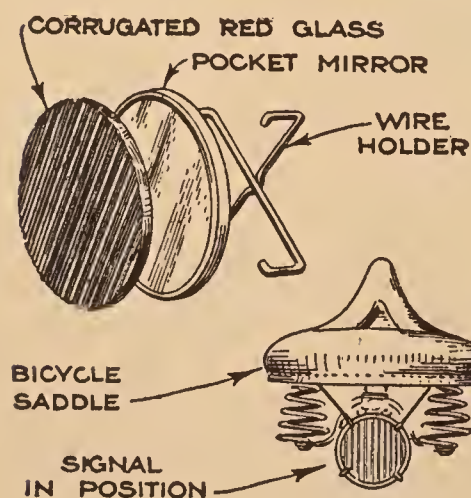
A Simple Method of Raising an Automobile Wheel for Removing a Damaged Tire, When No Jack Is Available



trouble discloses the fact that the useful implement has been left at home. All that is needed is a block of wood, about 2 in. longer than the distance from the underside of the front axle to the ground, with the tire inflated. In use, the block is set against the axle, where the spring is bolted on; this holds the block in place until the weight of the car has been placed upon it. If the car is then driven forward slowly, it is comparatively easy to ascertain just when it is highest from the ground. Then the emergency brake is set, and the damaged tire is clear of the ground.—Dale Van Horn, Lincoln, Nebraska.

Rear Reflector for Bicycles

An economical and practical danger signal for the rear of a bicycle or motorcycle is easily made from a pocket mirror



and a piece of transparent ruby glass, cut to the same size as the mirror, to which it is attached with wire clips in the manner shown. Corrugated glass, if obtainable, is to be preferred, although plain

ruby glass can be used with satisfactory results. If corrugated glass is used, the ribs or corrugations should be on the outside surface of the glass.

In use, the reflector is suspended from

the saddle as shown in the drawing, where its free, swinging motion will catch and reflect the light from the lamps of an automobile or other vehicle approaching from the rear with lamps lighted, warning the driver of the cyclist's presence.

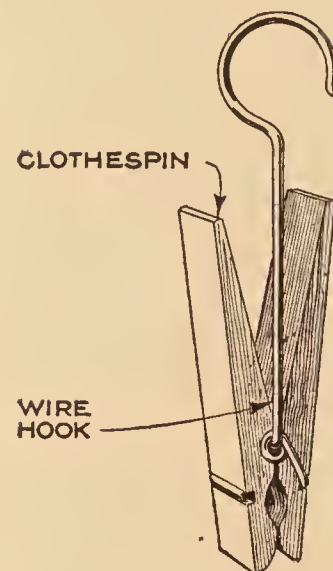
the saddle as shown in the drawing, where its free, swinging motion will catch and reflect the light from the lamps of an automobile or other vehicle approaching from the rear with lamps lighted, warning the driver of the cyclist's presence.

Rawhide for Repairing Snowshoes

Not infrequently a strip of the snowshoe lacing breaks, when the wearer is miles away from home with nothing to make the repair with. Experienced users of snowshoes have found it advisable to carry an extra strip or two of rawhide, laced into the snowshoe, for such emergencies.—T. C. Dyer, Collinsville, Conn.

Clothespins to Hold Washcloths

It is a source of constant annoyance in most bathrooms to try to keep the washcloths on the towel racks and holders, as such small cloths simply refuse to "stay put."



The drawing shows how ordinary spring clothespins can be used to hold these small cloths securely in position. A wire hook is fastened to the clothespin by inserting it through the opening at the center. One of these clips is provided for each person, and the cloths can be put in place and removed as easily as from the towel rack. A few clips fashioned in this manner will also prove convenient to the amateur photographer, as they will hold films, when drying, quite as well as the purchased articles.—Ruth Darling Shultis, Lansing, Mich.

Lubricating Leaf Springs

When the automobile springs become dry and begin to squeak, few people bother to separate the leaves and force lubricant between them, but many do attempt to squirt oil along the edges of the leaves in the hope that it will work in and stop the noise.

Ordinary machine oil is too thick for this purpose, but if cylinder oil is diluted with one-half or two-thirds of its volume of gasoline, much better results will be obtained. The gasoline makes the oil thin enough to seep in between the leaves,

and in addition, helps to cut through the old oil, grease, and dirt that is so often caked on the outside of the spring. The lubricating qualities of this diluted oil are not so great as of the straight oil, but wherever the gasoline mixture penetrates some of the oil will go, and for this use a little oil is better than none at all. Where means of forcing the leaves apart are available, this should be done, and the leaves lubricated with a good graphite grease. It is occasionally a troublesome job thoroughly to lubricate the springs, but it is one that repays the effort.—G. W. Greene, Madison, Wis.

Chute for Dumping Ashes from Stove Directly into Basement Can

The drawing shows how the ashpan of a heating stove may be altered so that it is no longer necessary to carry the ashes through the room when emptying them. A hole large enough for a 6-in. stovepipe is cut in the center of the ashpan and stove bottom, and a slightly larger hole in the floor immediately underneath; the latter hole is fitted with a flue ring, to guard against danger of fire. A section of 6-in. pipe is fastened to the ashpan and

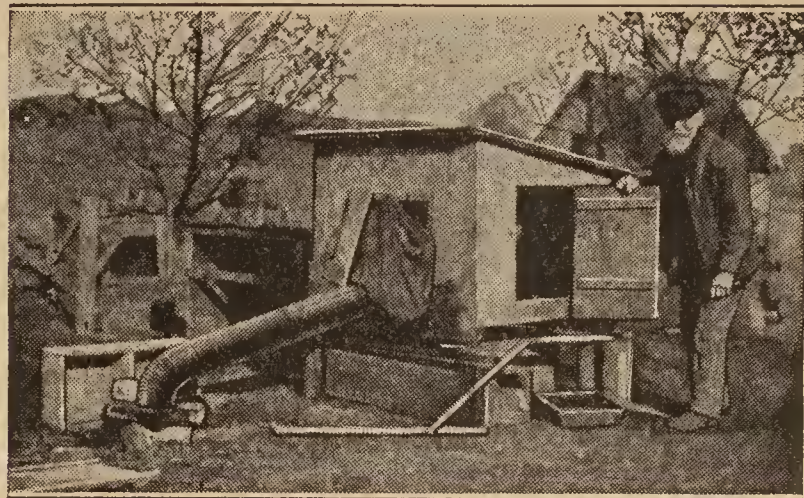
brazed, if possible, so that there is no danger of ashes escaping around the pipe; for additional safety, a ring of stove cement should be placed around the hole in the bottom, between the bottom and the ashpan, and should completely seal all apertures. Sections of pipe, passing through the floor, lead to a covered ashcan in the basement, where the ashes may be allowed to collect as they are shaken from the stove.—H. F. Grinstead, Columbia, Mo.

Making Modeling Clay

Modeling clay is made by kneading dry clay with glycerin instead of water. Work thoroughly with the hands. Work in process, or finished, must be moistened every day or two and kept covered, to prevent evaporation, which would leave the clay hard and difficult to work.

Smoking One's Own Pork

Even if one does not raise his own pork, he can cure it to his own taste



An Improvised Smokehouse for the Curing of Pork can be Built and Operated at Practically No Expense. Hickory Wood or Corncobs are Used for Producing the Smoke

and satisfaction, all that is required being a small container. A dry-goods box, or even a barrel, answers the purpose.

As shown, the container, or smoking chamber, is elevated above the surface of the ground, and the fire, which furnishes the smoke, is built in a tin pail a little to one side. A stovepipe carries the smoke from the pail to the smoking box, where the meat absorbs the characteristic flavor. A piece of scrap tin is used to cover the pail, and either corncobs or hardwood is used for fuel. Hickory is especially desirable, if obtainable, but corncobs will produce excellently flavored meat. Beech, and woods that contain resin, should not be used for smoking meat, as they will impart a bitter taste to the product.—John Y. Beaty, Chicago, Ill.

Phonograph as a Banding Wheel

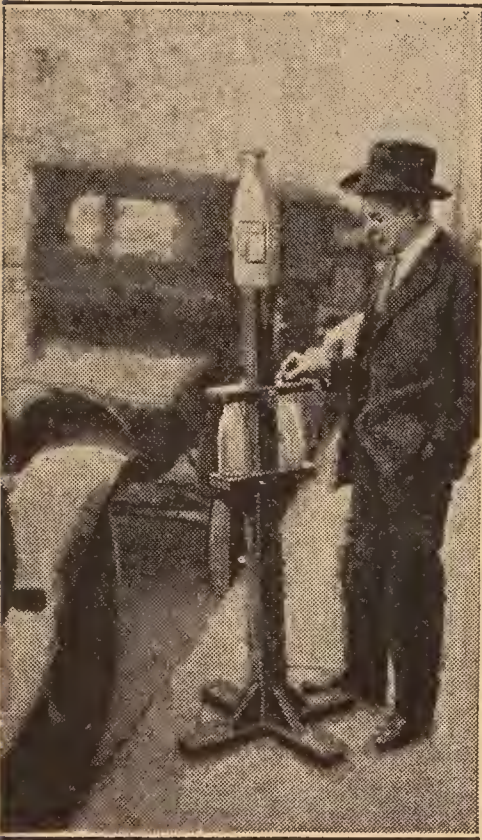
One of the most difficult pieces of work the decorator of pottery or china has to



do is to make a continuous band of color around an article so that it will not deviate from the horizontal but will meet perfectly at the ends. The drawing shows how a phonograph can be used as a banding wheel. The brush is held firmly at the proper height and brought in contact with the work as the latter rotates.

An Inexpensive Collection Box

A collection box for the purpose of receiving contributions for charitable or civic purposes, one that is inexpensive and that may be locked to protect it from petty thieves, is shown in the illustration.



The coin receptacles are milk bottles, placed on either side of the square upright, and supported by stout brackets. A movable crosspiece, with slits cut in it for the

insertion of the coins, rests upon the top of each bottle and is locked in position by a small padlock. Both brackets and crosspiece are counterbored, about $\frac{1}{2}$ in. deep, to receive the bottom and top of the bottles, so that when the crosspiece is locked the bottles cannot be removed from the stand.

"Baby-Proofing" the Door

The amount of watching and anxiety spent by mothers of small children to prevent them from getting their fingers caught between the hinge side of the door and the jamb can be almost wholly eliminated by a simple remedy.

A strip of carpet, leather, or similar material, is tacked to the edge of the door and frame; this does not interfere with opening or closing the door, but it does prevent little fingers from being caught and pinched, if nothing worse, by the closing door.—Charles Homewood, Ontario, Calif.

Using the Crank to Back the Car

Upon returning from a motor trip, I ran out of gasoline just as I had driven up to the garage. As it was late at night, it was impossible to obtain an additional fuel supply at the time, and so I attempted to push the car up the inclined approach to the garage. Failing in this, as the car was too heavy, the gears were thrown

into low speed and the starting crank turned, whereupon the car was cranked into the garage with comparative ease. The same idea worked equally well in backing the car by throwing in the reverse gear.—L. F. Bockstanz, Ludington, Michigan.

Open-Flame Gas Burners Wasteful

The open-flame gas burner with the large tip, generally known as the "jumbo," is thought by many to give more light without using more gas. This is certainly not the case, for such an open-flame burner, although it will burn six times as much gas as certain types of mantle burners, gives no more illumination. Moreover, like all open-flame burners, it is dangerous unless it is provided with a protective cage.

Swing Ropes from Inner Tubes

Many inner tubes are discarded while they still retain their "life" and elasticity, on account of having been run flat and rendered useless for their original purpose. A motorist having several such tubes put them to good use in the construction of a swing "jumper" for the small children of his neighborhood.

Two tubes were used for each swing; each tube was cut into three longitudinal strips, which were then braided, or plaited, to make a three-ply rubber band. The seat of a discarded nursery chair was suspended from these bands, the result being a jumper swing that provided endless entertainment for the youngsters.—G. E. Hendrickson, Argyle, Wis.

Stripping Film from Old Negatives

A quick method of removing the gelatin film from old glass photographic



negatives is somewhat different from the usual way of soaking and scraping. By this method it is only necessary to immerse the negative in water for a few seconds, or just long

enough to wet the film slightly; the superfluous water is removed with blotting

paper or a piece of cotton, then, with the balls of the thumbs, as shown in the photograph, the film is rolled off the plate.—T. K. Flanagan, Jersey City, N. J.

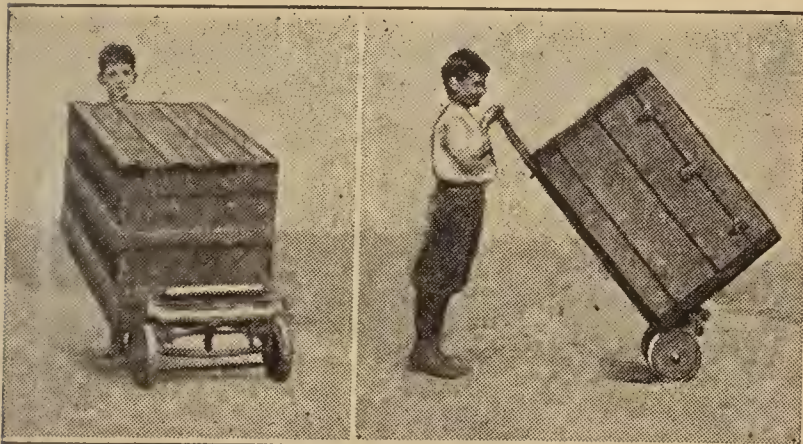
Multiple Connections for Electric Utensils

With electric toasters, percolators, grills, and other utensils coming more and more into general use, a whole meal can be prepared at the table with electricity. Each utensil comes equipped with a 4 or 5-ft. cord, and when two or more such devices are used at the same time the table becomes a tangle of electric wires. It is also very inconvenient to use a two or three-way socket and screw in the separate plugs and remove them before and after each meal.

By taking a narrow strip of hardwood and using it as a base for a suitable number of porcelain receptacles connected to the source of current, most of the wires can be dispensed with and the plugs inserted very conveniently. Sides are built around the base, high enough to conceal the inclosed receptacles. A cover, having holes large enough to permit the insertion of the plugs is also provided, and the whole finished as desired. The single connecting cord is brought through a hole at one end. The plugs of the utensil cords should then be removed and the wires shortened to a convenient length.—Chas. L. Kribs, Dallas, Tex.

Lawn Mower Used as Baggage Truck

The lawn mower has other uses besides smoothing off the lawn, for, as shown in the photographs, it can be used for the convenient transportation of trunks and similar bulky packages.

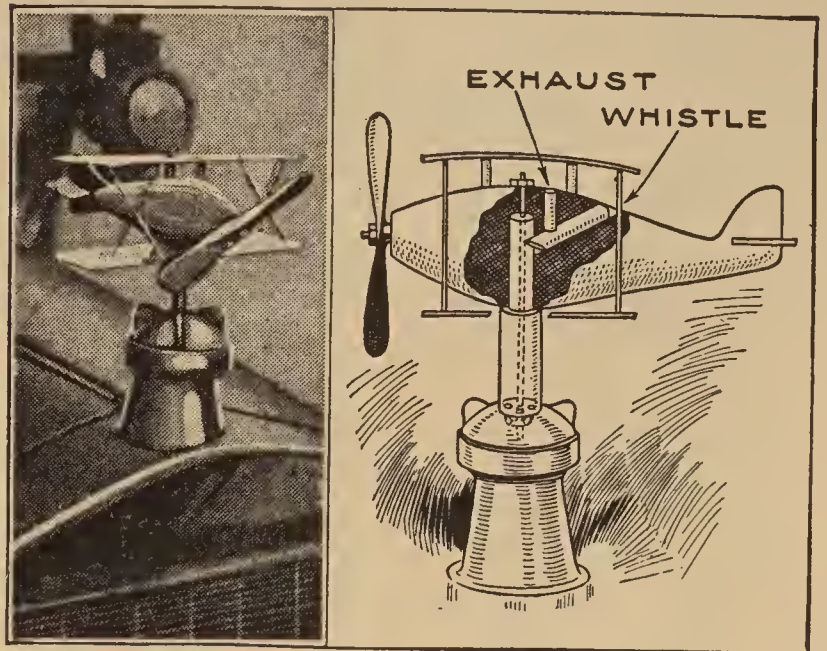


When the Mower is Reversed the Blades do Not Revolve as the Load is Pushed Forward

The mower is reversed, and the load is put in position so that it does not bear against the wheels, but is supported by the wooden roller. The mower may then be pushed or drawn as easily as a truck.

Whistle Warns of Overheating

The miniature aeroplane shown in the illustration is something a little more



An Automobile-Radiator Ornament, in the Form of an Airplane, Has a Whistle Concealed in the Wooden Fuselage, Which Warns the Driver When His Engine is Overheating

than a mere radiator ornament, because, concealed in the solid wooden fuselage, or body, there is a whistle that warns the driver that his engine is overheating.

The body of the airplane is carved from a solid block, and to it the tin wings and wire struts are fastened. A $\frac{1}{8}$ -in. hole is drilled through the center of the radiator cap for the long bolt that holds the plane in position. Around this hole three or four smaller holes are drilled, to permit the steam to pass up through the piece of tubing that supports the plane. A $\frac{1}{2}$ -in. hole is bored from the bottom of the plane, but not entirely through the body; this hole is directly over the upper end of the tubing and carries the steam to a small whistle fitted into a hole cut at an angle to the $\frac{1}{2}$ -in. hole, as indicated. Another hole in the body is provided for the escape of the steam into the atmosphere.—Hallie H. Holt, Enid, Okla.

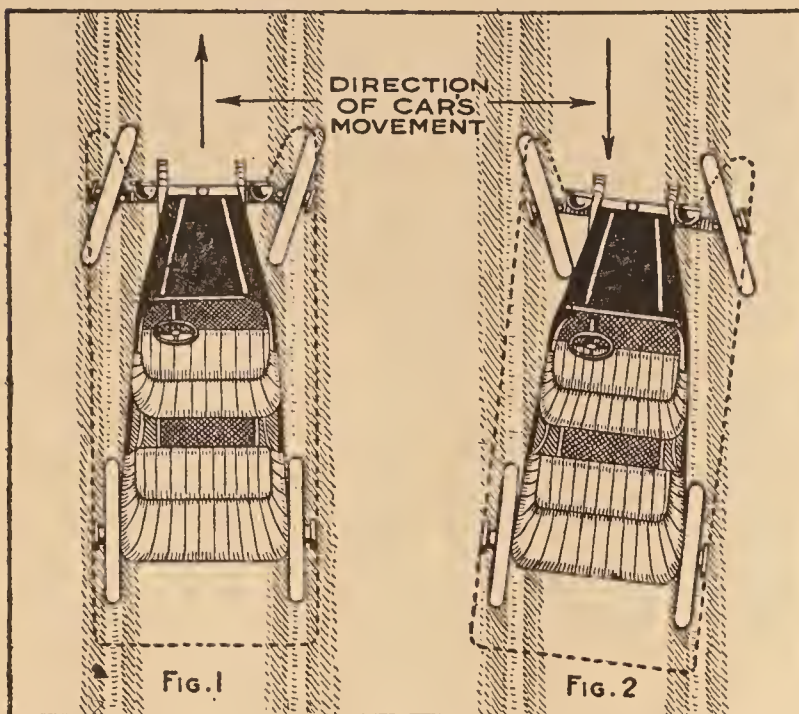
Removing a Cork from a Bottle

It is a common experience, and an annoying one, to have a stubborn cork forced right through the neck of a bottle.

Procure a piece of strong twine, about 1 ft. long, and tie a large knot in one end of it. Drop this knotted end down into the bottle; invert the bottle so that the cork will fall to the mouth below the knot in the end of the twine, then give the twine a sudden jerk. This will usually be sufficient to pull the cork through the neck and entirely out of the bottle.—Robert Lee Bird, Roanoke, Va.

How to Get Out of the Ruts

When driving an automobile in a rut, the average driver is at a loss, when

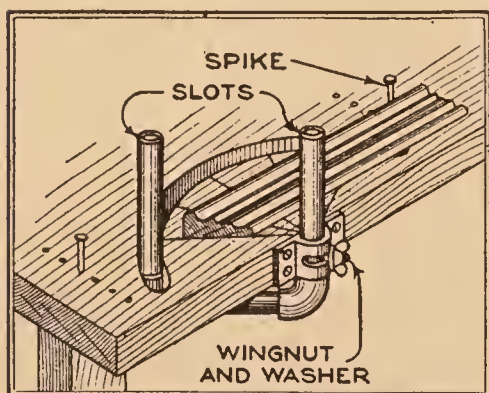


Climbing Out of a Rut When Moving Forward, as in Fig. 1, Is Difficult, but by Turning the Wheels, as in Fig. 2, the Car can Easily be Backed Out

meeting another car, as to the proper thing to do to get out of the way. Cramping the steering wheel over, as in Fig. 1, will not cause the car to climb out of the rut when driven forward. However, by turning the steering wheel in the opposite direction, as in Fig. 2, and placing the gears in reverse, the front wheels will immediately climb out.

A Miter Box for the Workbench

A permanent miter box on the carpenter's or cabinetmaker's workbench is almost as essential as a vise, and one built along the lines shown in the drawing



can be detached easily when its presence is undesirable.

A U-shaped saw guide is made from three pieces of pipe and a pair of elbows, and slots are cut

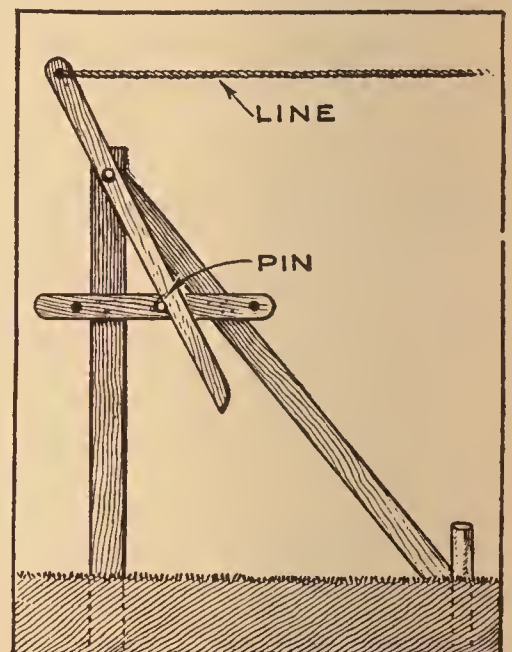
in the perpendicular lengths of pipe for guiding the saw, the slot nearest the worker being enlarged to accommodate a bolt, with a wingnut and washer, as illustrated. A 180° arc is laid out on the bench, and a slot cut through the top of the bench, through which one of the pipe arms is inserted. The device is attached to the edge of the workbench by

means of a clamp. The center of the clamp is slotted to fit the bolt used for tightening the guide. The work is held to the angle of the cut to be made, by means of spikes inserted into a series of holes drilled in the top of the bench. When it is desired to remove the mitering arrangement, it is only necessary to loosen the wingnut and pull the saw guide down, so that the tops of the guides are just flush with, or a little below, the surface of the bench, leaving the device available for instant use.—Truman R. Hart, Ashtabula, Ohio.

A Clothesline Tightener

A clothesline, high enough to swing the clothes free from the ground, must usually be

lowered so that it can be reached to hang the clothes on it. The arrangement shown in the drawing permits the line to be lowered to an accessible position and makes use of the customary props unnecessary.



A lever is bolted to one of the posts, the clothesline being tied to the end of the former, as illustrated. When the line has been drawn up as taut as possible by means of the lever, it is held in position by inserting a pin into a stout bar that is nailed to the post and drilled to receive the pin.

Pen Drawings from Photographs

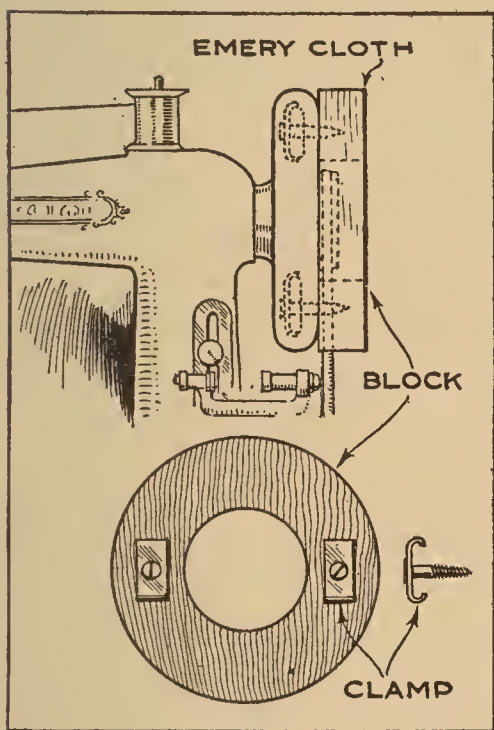
Pen-and-ink or pencil drawings and sketches can be made from photographic prints or enlargements, with no trace of the photographic origin remaining to reveal the source of the design, by a simple process.

The print or enlargement is made in the usual manner, and dried, after which the outline and detail is worked in with waterproof India ink or pencil; this leaves the print ready to be bleached. A bleaching solution is made by dissolving 60 gr. of potassium iodide and 6 gr. of iodine in a pint of water. Placed in this solution, the

photographic image takes on a dark blue color. After removal from the bath, the print is washed and introduced into a plain hypo solution, where the image disappears entirely, while leaving the inked outline and detail still plainly visible. After the print has been washed and dried, any additional detail can be added.

A Hair-Clipper Sharpener

A pair of hair clippers are of little use when they once become dull, and means for sharpening them are not usually as conveniently at hand as are those for sharpening other tools. Clippers must be sharpened on a flat surface and cannot be sharpened on the periphery of a grindstone or emery wheel, as a pair of shears or a knife. To construct the grinder illustrated, a disk is cut from a 1-in. board, a little larger



than the handwheel of the home sewing machine, and a hole is cut through the center to clear the clutch of the machine, allowing plenty of room to prevent it from binding. Two metal clamps, long enough to reach over two spokes of the wheel, are made; these are used to clamp the wooden wheel to the handwheel of the machine, ordinary wood screws being used for the purpose. The wooden wheel is faced on its exposed side with a piece of the finest emery cloth obtainable. The emery cloth is cut to size and attached smoothly to the wooden surface with ordinary liquid glue.

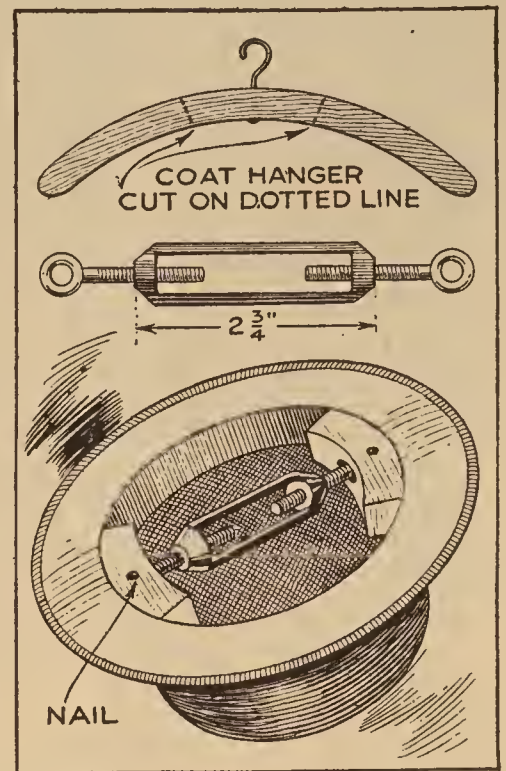
In use, the clutch of the sewing machine is released, and each of the two cutting parts of the clippers is held flat against the emery cloth as the wheel revolves. A newspaper may be fitted around the head of the machine to prevent particles of the abrasive from entering the operating parts.

Wire wastebaskets fastened over the electric lights of a playground or gymnasium will effectively prevent breakage of the globes.

Making a Hat Stretcher

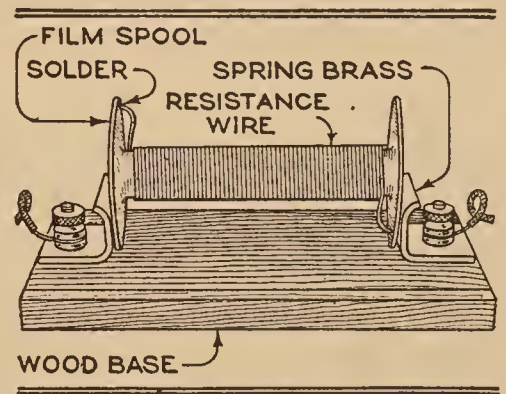
While the individual demand for hat stretchers is not large, there are times when such a device can be advantageously used, and the illustration shows how such a stretcher can be made from a small turnbuckle, such as can be bought for a few cents, and an ordinary coat hanger.

The coat hanger is cut as shown, and the curved ends are attached to the turnbuckle. A hole is drilled through the centers of the curved wooden sections, and the ends of the turnbuckle attached to them with nails. In use, the stretcher is inserted inside the hat and the turnbuckle turned, stretching the hat as desired.—Harry Stark, Brooklyn, N. Y.



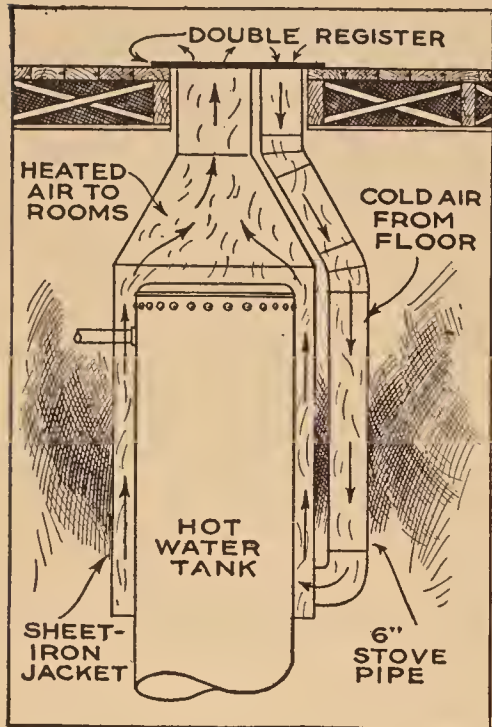
Resistance Units from Film Spools

Fine resistance units for the use of electrical experimenters can be made from old film spools. The spools can be had from any photographer for the asking, and it is on these that the resistance wire is wound, the ends being soldered to the metal flanges of the spool. A holder, such as the one shown in the drawing, is used, and consequently all the resistance spools must be the same length. By winding a number of spools with a varying number of turns of resistance wire, and marking the known resistance on them, it is a very simple matter to substitute one spool for another by inserting it between the clips, in the same manner as a cartridge fuse. The ends of the spools bearing against the clips are polished bright, to provide a good contact, and the clips should press tightly against them.



An Auxiliary Heating System

The particular installation described in this article is typical of many others in which water is heated by a coil inside the furnace firepot, an arrangement providing



plenty of hot water even in the mildest weather. In cold weather, when the furnace was heavily fired, the water would get very hot; this caused a real loss of fuel which should have been used for heating the upper part of the house, and also kept the temperature

of the basement higher than desirable for the storage of fruit and vegetables. An effort to jacket the tank with asbestos paper was made, but this resulted in the water boiling before the house was warm enough to permit shutting the furnace off. To overcome the difficulty, the tank was jacketed as shown in the drawing, and the heat conducted to the room above through a double floor register, the cold-air pipe being put in to create a better circulation of heat and to avoid the necessity of closing the register when shoveling coal or ashes below. The jacket was made in halves and fastened together around the boiler with tin straps. The housing, or jacket, covers only about three-fourths of the heater, as the hottest water is, of course, always at the top of the tank.

The advantage of such an auxiliary heater is that the colder the weather, the more efficient it becomes, while in mild weather the register can be closed and the jacket provides an effective insulation for the tank and prevents, in large part, the radiation of heat within the basement. —W. S. Robinson, Minneapolis, Minn.

An Odd Goldfish Bowl

An electrician has discovered that a burned-out 1,000-watt electric bulb can be used as an aquarium. The only alteration made in the bulb is a handhole in the large end. This hole is formed by heating the area with the flame from a blowtorch

until the glass is plastic, when the vacuum inside the bulb will suck in the softened glass. While still soft, the unnecessary glass is broken off, and the edge of the hole finished smooth with a heated iron rod. After the glass has been allowed to cool gradually, the bowl is ready. It is kept in a vertical position by screwing it into a socket mounted on a wooden base, the socket being concealed underneath a suitable canopy.—George F. Paul, Chicago, Ill.

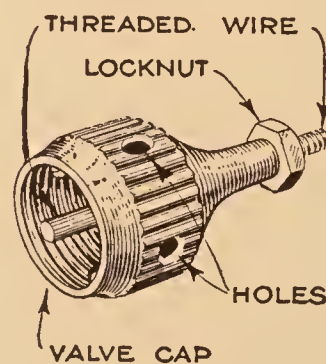
Bathing Cage Birds

Young canaries and other cage birds often refuse to take their baths, a lack of which is usually fatal to both the plumage and song. I had a canary that refused to have anything to do with the bath dish and I finally hit upon the idea of using an atomizer, such as used for spraying the throat.

The atomizer was filled with water and the bird sprayed, to its apparent great enjoyment.—Jack L. Dickler, New York, New York.

Deflating Inner Tubes

Everyone who has repaired inner tubes has experienced the trouble incident to deflating a tube so that it contains no air. If the tube is to be repaired or put away for future use, it is necessary to roll it up



in order to expel all the air. Rolling the tube requires the use of both hands, and the difficulty of holding the tire valve open while the air escapes is apparent; the usual method is to resort to a match, nail, or similar article. A better

way is to use a simple device made from an old valve cap.

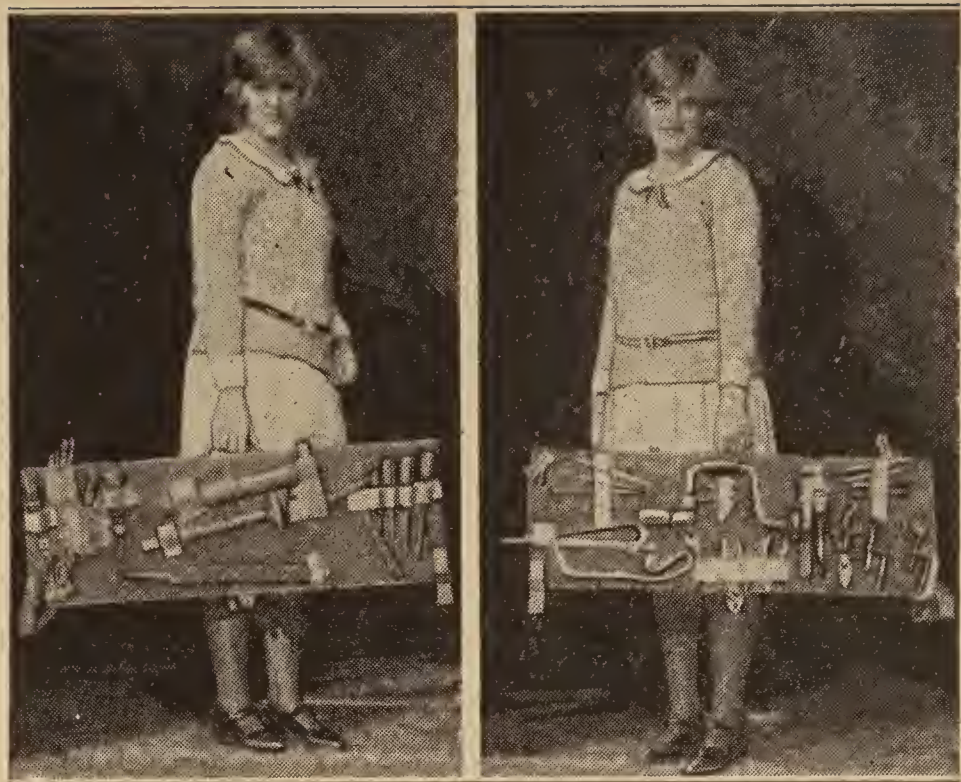
A hole is drilled through the cap lengthwise, and, if possible, threaded to take a short length of stiff wire or rod that is similarly threaded and provided with a nut for locking it in place. If it cannot be threaded, the rod may be soldered in place. Several holes are drilled through the walls of the cap. When this cap is screwed onto the valve the projecting wire in the center will press down the valve and hold it open so that, as the tube is rolled up, the air will escape through the holes in the side of the cap.—John A. Ford, Los Angeles, Calif.

A Convenient Tool Rack

The rack for holding tools shown in the photo has all the advantages of a tool box, none of its drawbacks, and several advantages of its own.

A piece of scrap lumber is used for the rack; it is fitted with two feet, one at each end, made of strap iron, and with a handle, taken from a screen door, at the top. The tools are held on the board by means of canvas straps, nails, and wire hooks.

All tools are instantly accessible, and the rack can be picked up and carried to any part of the house, so that there is no running back for the tool that is always forgotten. Room for more tools can usually be made.



A Rack That Keeps the Household Tools Always at Hand: The Tools Are Instantly Accessible, and the Rack can be Carried Anywhere, as It is Provided with a Handle

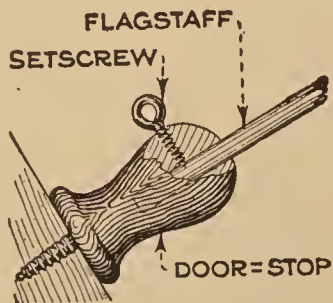
Screwing Down Grease Cups

Most automobiles have several grease cups located under the floorboards, and these must be screwed down occasionally. This operation is often neglected, because the floorboards must be lifted in order to get at the cups.

To overcome this difficulty, a small hole should be drilled and tapped in the center of each grease-cup cap. A machine screw is screwed into this hole and riveted securely on the inside. If holes, large enough to admit the end of a screwdriver, are then bored through the floorboards, the screwing down of the caps becomes the work of a few minutes.

Standards for Displaying Small Flags

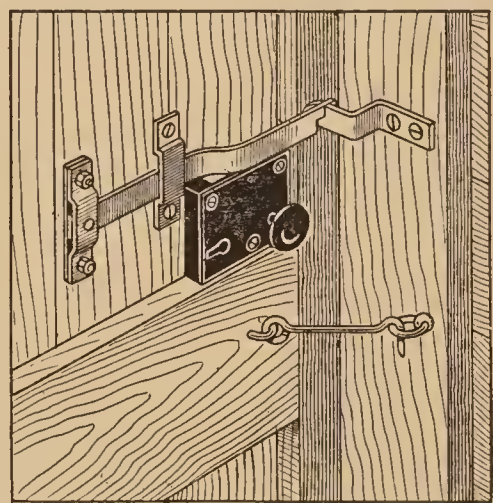
When decorating the exterior of a house with small flags it is not usually desired to nail the staffs to the building because the nails split the sticks. The trouble can be overcome by using standards of the type illustrated, which are made from wooden doorstops. Remove the rubber tip and drill a hole to a depth of at least 2 in. and just large enough to fit the flagstaff. A setscrew, made from a screweye, prevents the staff from becoming loose and falling out. Several such standards can be arranged on a board if it is desired to prevent marring walls or exterior finish.



Convenient Garage-Door Lock

It is hard to improve on two stout wire hooks for fastening a sliding door on a garage after the car has been run in, but when the car has been taken out, and the driver wishes to get away in a hurry, the hooks are inconvenient, as he must go inside again in order to fasten them. A

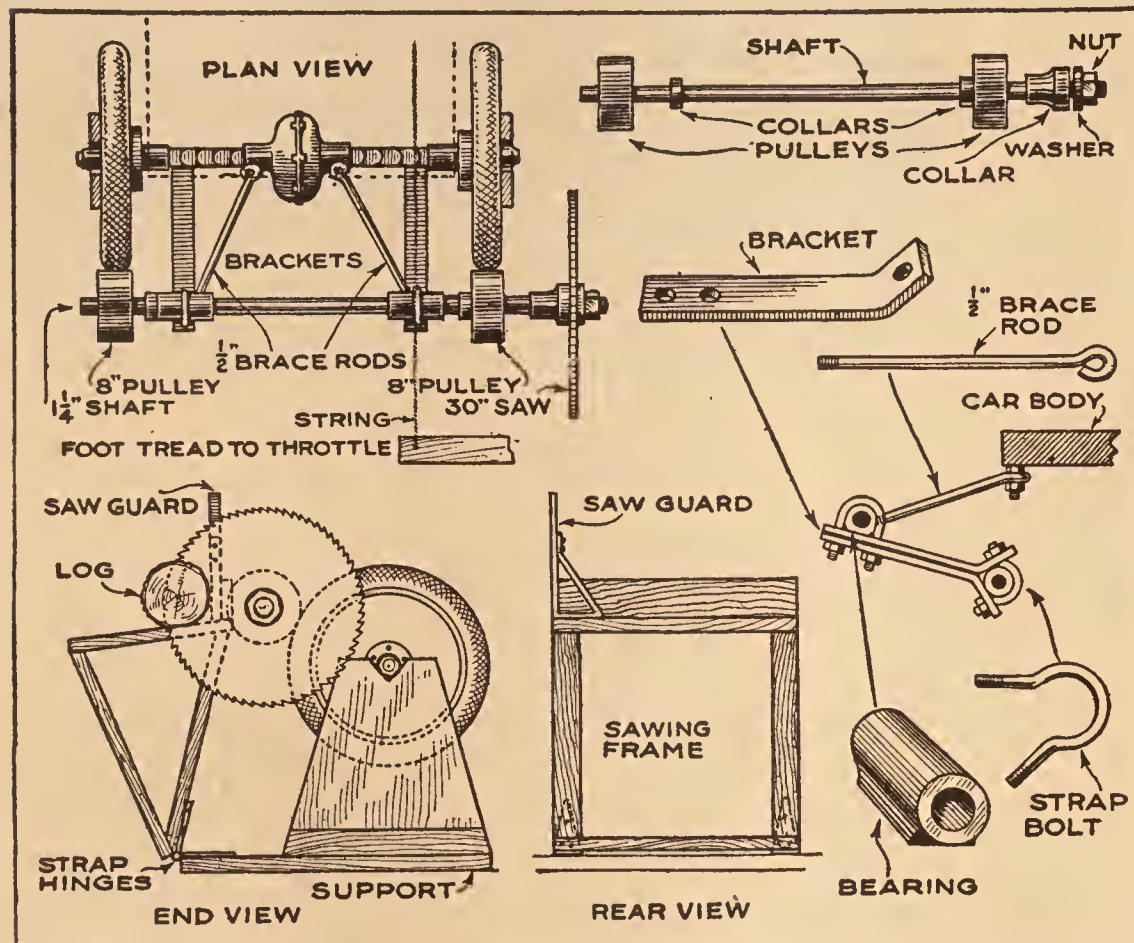
quickly operated fastener, secure enough for use in a single garage when the car is out, can be made from a common door lock and a few pieces of flat iron. A latch is made from the flat iron, as shown in the drawing, and the lock is screwed to the door so that the bolt comes directly under the latch. When the bolt is raised with the key, the latch is lifted and the door may be shut. Turning the key then withdraws the bolt, and the latch drops down over a strap screwed to the lintel. A notch is cut in the end of the latch to fit over this strap, preventing the door from being opened without the key.



□ A 1/2-in. hole, cut in the middle of one edge of a towel and sewed like a button-hole, makes it possible to hang the towel so that it cannot fall.

Saw Driven by an Automobile

A comparatively simple arrangement for operating a circular saw, for cutting up cordwood, and for similar purposes, can be operated by any automobile. A 1½-in. shaft, having two 8-in. pulleys permanently attached and spaced such a distance apart as to line up with the rear wheels of the car, is attached to the rear axle by two wrought-iron brackets provided with bearings.



A Simple Arrangement to Enable the Auto to be Used as a Driving Medium for a Circular Saw: No Alterations are Made to the Car, and the Device may be Attached or Detached in a Very Short Time and No Belt Is Necessary as It Has a Friction Drive

The shaft bearings are secured with strap or U-bolts, passing through slots so as to permit moving the pulleys back or forth, as may be desired. The right end of the shaft is fitted with a collar and thread for mounting a circular saw of about 24-in. diameter. From each bracket a ½-in. round rod runs to the spring supports of the car to give additional rigidity. The engine is controlled from the rear of the car by a cord attached to the throttle on the carburetor, a spring being attached to the throttle to keep it normally closed, or at normal speed. This is to prevent racing of the motor.

The saw table is of the swinging type, with an extension on which is placed the vertical supports onto which the car is jacked. This arrangement keeps the table steady and in line with the saw. In use, the car is driven to the scene of operations, the rear wheels are jacked up and let down on the supports, the brackets

and braces attached, and the bearings adjusted so that the pulleys will be in contact with the tires.

Such an outfit can be made up very simply, as no belt is needed, and the materials required are quite generally obtainable at slight cost.

Diffused-Focus Photographs

To get the "soft" photographic effects that are deservedly popular, a proper soft-focus lens should be used, although there are various ways to obtain this effect either in the negative or in making the print. One advantage of diffused-focus prints is that undesirable freckles and similar blemishes are not so conspicuous, and retouching is entirely eliminated, or, at least, the amount necessary is greatly reduced.

One method of obtaining this result is deliberately to make the negative out of focus. In other words, focus the camera sharply on the subject, and then move the lens just a trifle back or forward. A similar effect can also be obtained by reversing the ground glass in the focusing screen, so that the rough side is out, and then focusing sharply, making the exposure in the usual manner, or the plate may be placed in the holder with the sensitized side away from the lens. Another method that gives better results than any of the foregoing but requires a somewhat longer exposure, is to tie one or more thicknesses of chiffon over the lens after sharply focusing on the subject.

If it is desired that the negative be as sharp as possible and show every bit of detail, the resulting prints can be softened by placing a piece of clear glass or celluloid between the sensitized paper and the negative; the thicker the material used, the greater the diffusion. Very attractive results can also be obtained by interposing a piece of chiffon, or some similar gauzy material, between negative and paper; the best results by this means are to be had on large prints. As stated above, a real diffused-focus lens should be used to get the finest results.

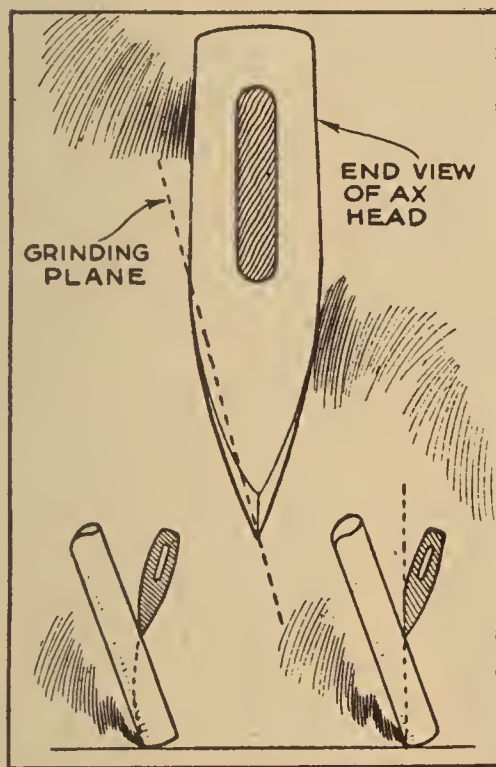
Preventing Flapping Window Shades

It is often desired to have a window shade partly or entirely drawn when a draft from an adjacent window or door would cause damage or annoyance by flapping it. This trouble may be avoided by placing a small hook in the center of the lower sash, with the hook pointing down, to hold the ring with which most shades are provided.

In placing the hook, draw down the shade until the ring can be slipped over the hook, while the roller catch is not in action, allowing the tension of the roller spring to pull against the ring and hook. This method will hold the shade flat and quiet in a very considerable draft. The tension of the spring may be increased if necessary.

Sharpening Stakes with a Hatchet

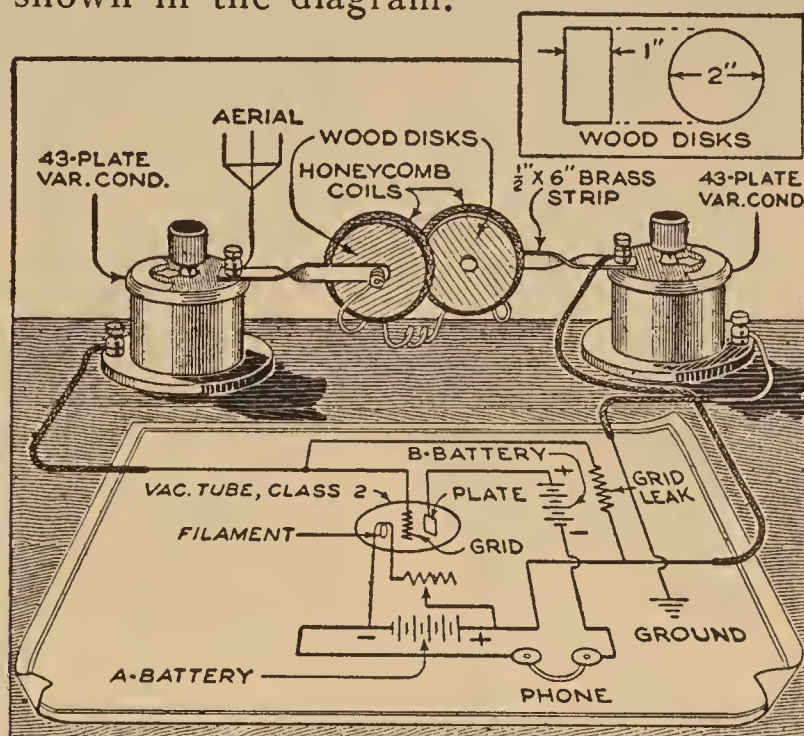
When sharpening the ends of stakes, bean poles, and similar sticks that are to be inserted or driven into the earth, many strokes of the hatchet or ax used for sharpening the point are usually needed



to get a satisfactory point. All this trouble and extra work may be entirely overcome by sharpening the hatchet or ax properly. When grinding the blade, one side and then the other is usually brought against the grindstone to produce a bevel on both sides, as in the left-hand illustration. Instead of doing this, allow one side of the blade to lie nearly flat against the stone, then put a bevel on the opposite edge in the usual manner, to give the edge shown in the right-hand view. When pointing stakes, the flat surface must be the one nearest the wood. The blade will be found to enter quite easily instead of glancing off, and the resulting cut will be straight, as indicated by the dotted line, thus saving quite a lot of energy and producing much neater work.—Edward S. Perrin, Girard, Illinois.

Combining Detector and Amplifiers

A handy way to mount honeycomb coils, for testing in a receiving circuit, if a standard mounting is not at hand, is shown in the diagram.



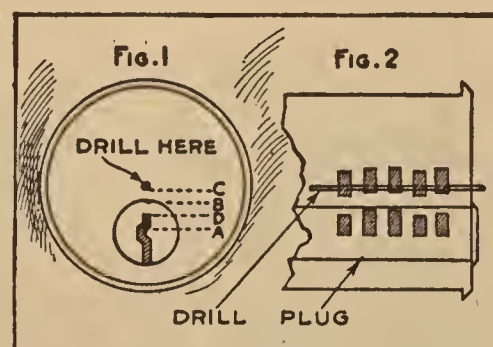
A Simple and Quickly Adjusted Emergency Mounting for Honeycomb Coils: This Method may also be Used in Constructing a Wave Meter

Two thin strips of spring brass, $\frac{1}{2}$ by 6 in., are drilled at each end and given a quarter-twist; these are placed under the binding posts of standard-type variable condensers of .001-microfarad capacity. The coils are mounted on wooden disks, 1 in. thick by 2 in. in diameter, drilled at the center to take a small binding post that holds both the lead wire and the brass strip. By moving the condensers, any degree of tuning is possible. The same idea for mounting a coil on the condenser is very handy for use as a wave meter, but in this case, the coil must be of known inductance, and the condenser of exactly .001-microfarad capacity, placed in series with a battery, key, and buzzer.

Opening Cylinder Locks

The highest type of cylinder lock, which is practically proof against picking, can be opened without impairing the usefulness of the lock or beating down the door.

Measure from the bottom of the pins visible in the lock at A to the junction of the plug and cylinder B, allowing for the shoulder on the plug. This gives the

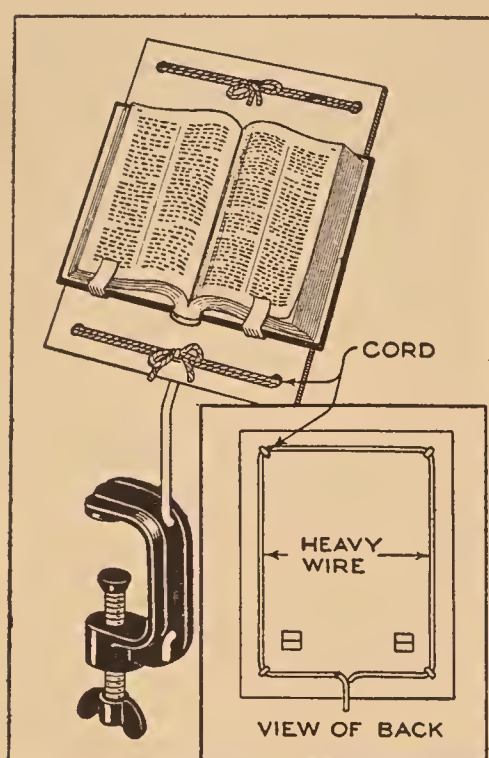


length of the longest pin. Transfer this distance to the face of the lock directly above the pins at C, measuring from the top of the key slot D. Insert a blank key that fits the lock and drill a small hole, with a No. 60 or smaller drill, at a point slightly above C. Run the drill carefully

through all the pins and leave it sticking in them, all of the upper halves of the pins being held on the drill as indicated. When the blank key is taken out the lower pins will drop free, allowing the lock to be turned open. The hole in the face, neatly plugged, is not noticeable.

A Handy Book Rest

A book rest that can be conveniently and quickly attached to the arm of a chair or the edge of a table re-



quires nothing more than a small iron clamp, a few feet of heavy wire, and a piece of stiff cardboard or wallboard.

The 8 by 10-in. wallboard book support is punched at each corner, 1 in. from the edge. The wire is bent to a rectangular shape, a little

smaller than the back of the card, and is fastened in place with cords drawn through the holes. A 7 or 8-in. length of wire is left for attachment to the clamp, in which two holes are drilled as indicated in the drawing, the wire being passed through these and fastened. The jaws of the clamp are prevented from marring the finish of the furniture by pieces of felt or rubber glued to them. Two tin strips, $\frac{1}{2}$ in. wide, are doubled and bent at right angles; the ends are inserted through slots cut near the bottom of the book holder, spread to hold them fast, and the other end of the doubled strips is bent to form clips for supporting the book.—Mrs. R. D. Shultis, Lansing, Mich.

Waterproofing Laboratory Woodwork

When chemicals are spilled on the tables and benches of a laboratory and allowed to dry, they will crystallize, and, with the least movement of air, the place is filled with flying particles of chemicals. This is particularly troublesome in photographic dark rooms and laboratories, where such minute particles may settle upon the sensitive surface of plates and

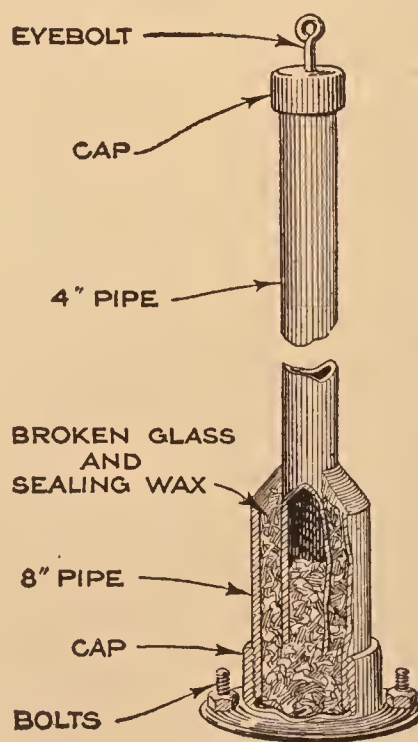
paper, generally resulting in spots of one kind or another; the developer or the sensitive material is then blamed, as the spots are usually indistinguishable until the plate or paper is developed.

Of course, in a laboratory of this kind, it is almost impossible to prevent the woodwork from being splashed with chemicals, but to prevent the absorption and subsequent crystallization, the benches and shelves should be waterproofed so that none of the liquid can be absorbed into the wood, and that it may be wiped up easily.

A simple method of waterproofing such woodwork makes use of paraffin wax. The wax is melted at as low a temperature as possible, and poured onto the wood. A warm flatiron, just hot enough to melt the wax, is used to rub the wax into the wood. The wood should be clean and dry before the wax is applied, and to make certain of this the surface should be sandpapered.

Insulating Radio-Aerial Mast

Being required, by a city ordinance, to insulate the mast supporting his wireless aerial from the roof, a wireless amateur with limited material and funds solved the problem in the manner indicated in the drawing.



A piece of 8-in. pipe and flange coupling were used as a standard to support the iron-pipe mast. The part forming the standard was 14 in. long and was secured in place by bolting it down. A layer of

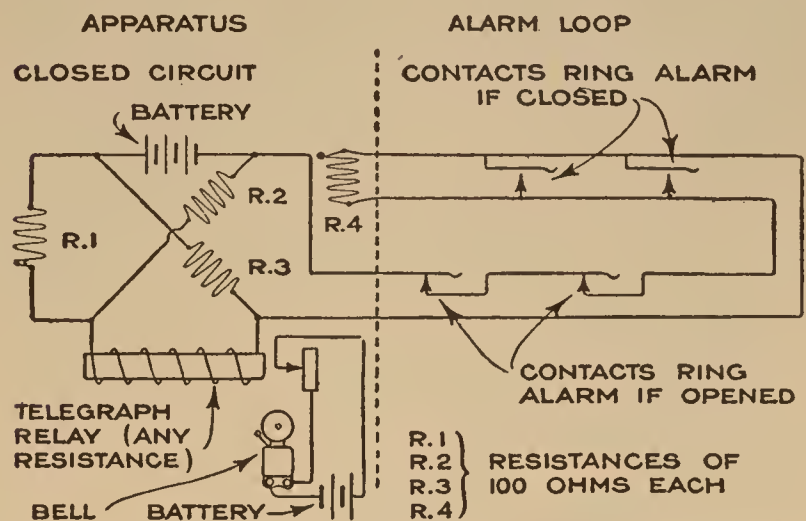
about 4 in. of broken glass and melted sealing wax was run into the bottom of the base, and after cooling, the mast was inserted, and the space between mast and base filled in the same manner.

Burglar-Alarm Circuit

The burglar-alarm circuit shown in the drawing cannot be put out of order without giving an alarm. The only special apparatus required are a relay, which may be of most any type, four coils of equal resistance, and the closed-circuit battery.

With the alarm circuit completely connected as shown, the relay will remain inoperative because both sides of the battery, positive and negative, are connected to each end of the relay winding through equal amounts of resistance. The relay is in a neutral position with respect to the battery and receives no current. Now, should the side of the bridge forming the alarm loop become unbalanced, short-circuited, or broken, the current would flow

through the relay winding, causing it to operate and ring the bell, or other alarm device.—C. M. Crouch, Minneapolis, Minn.



A Burglar-Alarm Circuit That cannot be Tampered With without Giving an Alarm; Short-Circuited or Broken Wires Cause the Bell to Ring

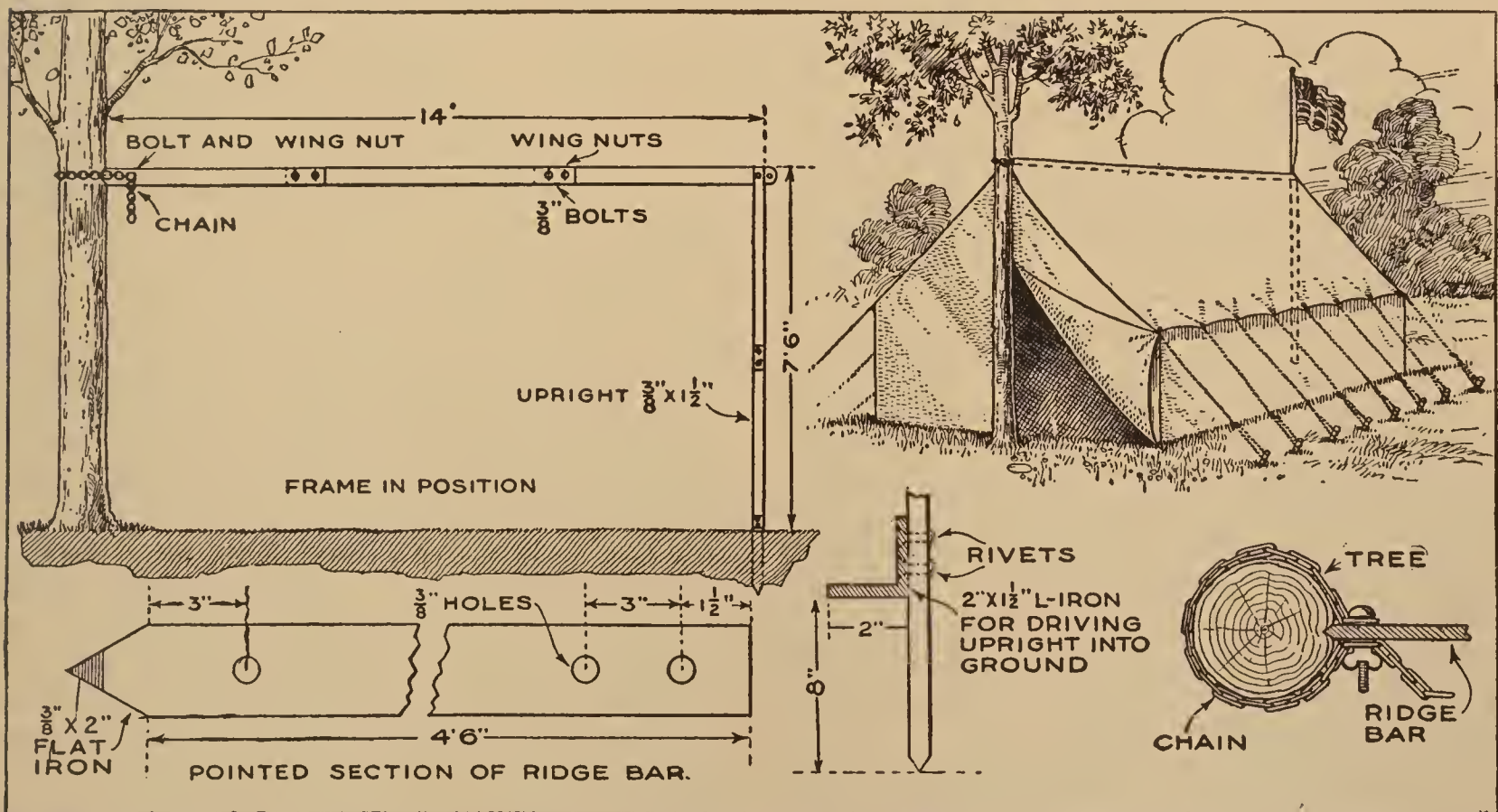
A Set of Folding Tent Poles

Motor tourists, and others who realize the necessity of traveling light, and with their tent and other equipment stowed away as compactly as possible, will appreciate the merits of the folding tent poles illustrated.

The poles are made of flat bar iron, cut into convenient lengths, and assembled by means of bolts and wing nuts. One section of the horizontal bar is sharpened at one end and provided with a suitable length of chain for holding it to a tree or post. The bottom section of the end pole is pointed and provided with an L-shaped piece, about 8 in. from the end, to serve

as a stop, and to assist in driving it into the ground. After the supports have been assembled and erected, the tent is put up, pegged, and guyed in the usual manner. The bars should be given at least one coat of paint to prevent rust.

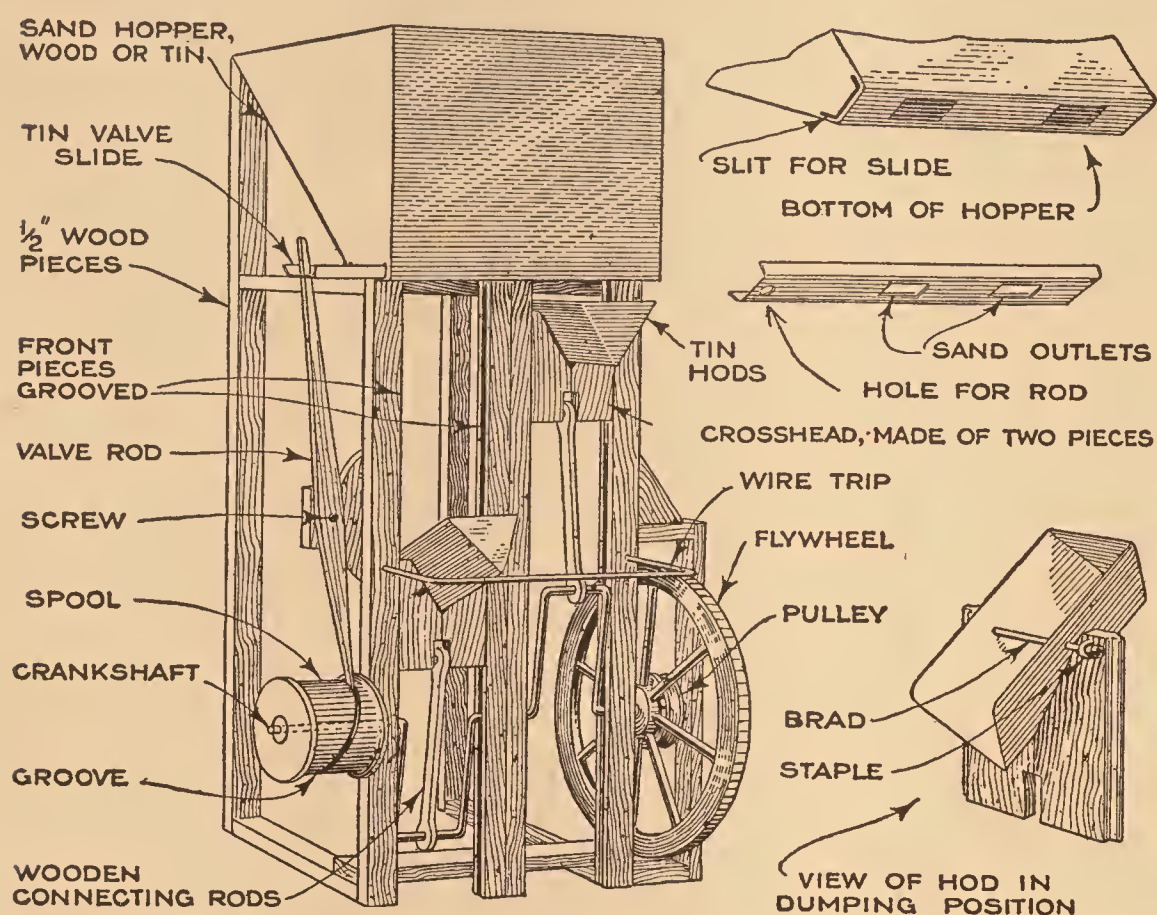
The same idea can be applied to the construction of a set of wooden poles if it is found undesirable to make use of the metal sections. However, in this case some form of slip or strap joint should be used so that it will not be necessary to make the ends of the sections overlap each other, which would make an unsightly joint in a wooden pole. The entrance to the tent may be made at either end.—P. P. Avery, Garfield, N. J.



A Set of Sectional Tent Poles, the Value of Which is Realized by Motor Tourists and Campers Who must Travel with Their Equipment Stowed in the Most Compact Manner

Toy Sand Engine

A toy sand engine that will provide the amateur mechanic with some interesting applications of mechanical movements, and give endless entertainment to the children, can be made from a few easily obtained parts. The machine is operated by the weight of sand, which runs from the bin at the top into the hods. As only one of the hods is filled at a time, one of the crossheads and connecting rods is forced down alternately, the small flywheel preventing the device from stopping on a dead center. As the hod reaches the low-



A Toy Engine, in Which Some Well-Known Mechanical Movements are Applied: The Sand Hods are Automatically Filled from the Bin by a Slide-Valve Arrangement, Similar to That Used on Steam Engines

est point of its travel, one end of it comes into contact with the tripper, which over-balances the load and dumps the sand.

The hods are alternately filled with sand

from the overhead bin by a slide valve, which, when the engine is started is automatic in action. The valve consists of a strip of tin with two openings which correspond to similar openings in the bottom of the bin. These openings are so spaced that when one hod is receiving sand, the opening on the opposite side is closed and the hod on that side is descending. The valve slides horizontally and is operated by a valve rod pivoted to a bracket on the frame. The valve is timed to open and close the sand openings by a grooved cam firmly secured to the end of the crankshafts. An old spool forms the basis for the cam, and an elliptical groove is cut into it large enough to take the end of the valve rod. The cutting and proportioning of this cam so as to have the slide valve open and close at the proper time will probably require more or less experimenting before the valve is properly "timed." The nearer the cam groove comes to the ends of the spool, the greater will be the travel of the valve rod. The upper end of the valve rod fits into a hole provided for it in the end of the slide valve. The valve should be "timed" so that it will remain open until the hod which is being filled with sand is halfway down. Also, the valve

should be adjusted so that just before one hod is being tripped at the end of its travel, the other hod begins to receive sand.

Testing Cylinder Pressure of Engines

A considerable part of the engine trouble experienced by automobilists is caused by poor compression in the cylinders. This condition may often be observed and recognized by a lack of reserve power, and difficulty in starting the engine quickly after it has stood idle for several hours. A simple little device can be made that will quickly indicate the cylinder having the low compression.

A rubber stopper, large enough to fit very tightly into the priming cups, should be obtained, and a hole drilled through its center. Next, fit into this hole the inlet

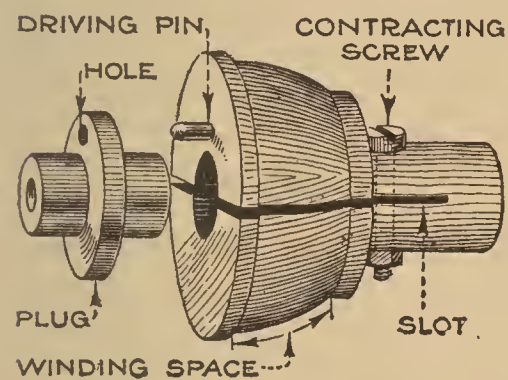
tube of a tire-pressure gauge, care being taken to make an air-tight connection.

To test the compression of a cylinder, detach the spark connection so that the charge will not fire, and press the stopper into one of the priming cups. It may be necessary to wire the stopper to the cup to insure a tight connection. Start the engine, and while it is running idle, turn the primer cock so that the cylinder gas will enter the gauge under full pressure at each upstroke of the piston. Note the gauge reading; test each cylinder in turn, and a comparison of the readings will indicate which cylinder is causing the trouble.

Variometer-Winding Form

Amateurs who wish to build their own radio instruments will find the stator-coil winding form illustrated a great convenience. The larger piece is the form proper; it is made of hardwood, the radius of the section on which the wire is wound being the same as the radius of the winding seat in the stator half, less twice the over-all thickness of the wire used. A cylindrical section, a few inches long, is turned on the smaller side of the form, and the face on the larger side is recessed to take the plug shown. This plug may be of hardwood or metal, as preferred; it is drilled to fit a driving pin driven into the form, and is

centered, as is the opposite end of the form, to permit winding between lathe or other centers. The form is slotted, as shown, for a portion of its



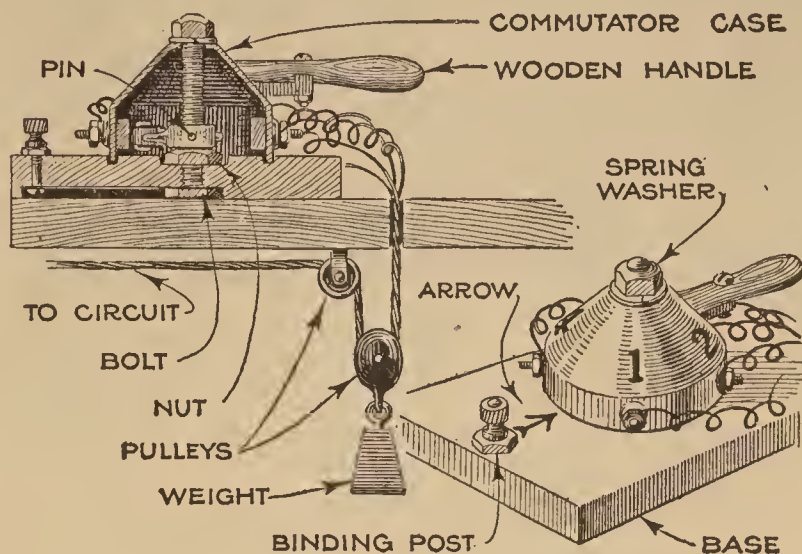
length, and fitted with a screw and nut. When the form has been wound, and the stator half coated with adhesive, the form is dropped into place and weighted or clamped until the cement is dry. Then the contracting screw is tightened, and the form can be removed very easily.—H. F. Lowe, Washington, District of Columbia.

Four-Way Switch Made from Old Automobile Timer

For low-voltage circuits, where there are not more than four different lines over which the current is to be distributed, an old timer from a light automobile can easily be converted into a four-way switch.

Make a base of some insulating material, about 8 in. square and 1 in. thick, and drill a hole through the center as large as the end of the shaft over which the timer roller fits. Counterbore this hole large enough to take a bolt head, and cut a similar depression in the top of the base; both should be concentric with the hole. Get a bolt over which the timer roller will just slip, and $\frac{1}{2}$ in. longer than the distance between the bottom of the base and the top of the timer shell when the latter is set on the base. Cut the threads the entire length of the bolt, file the head down to a thickness of about

$\frac{1}{4}$ in., and drill a small hole $1\frac{1}{2}$ in. from the head. Push this bolt through the



Four Electrical Circuits Controlled from One Switch:
The Switch is Made from a Timer Taken
from a Light Automobile

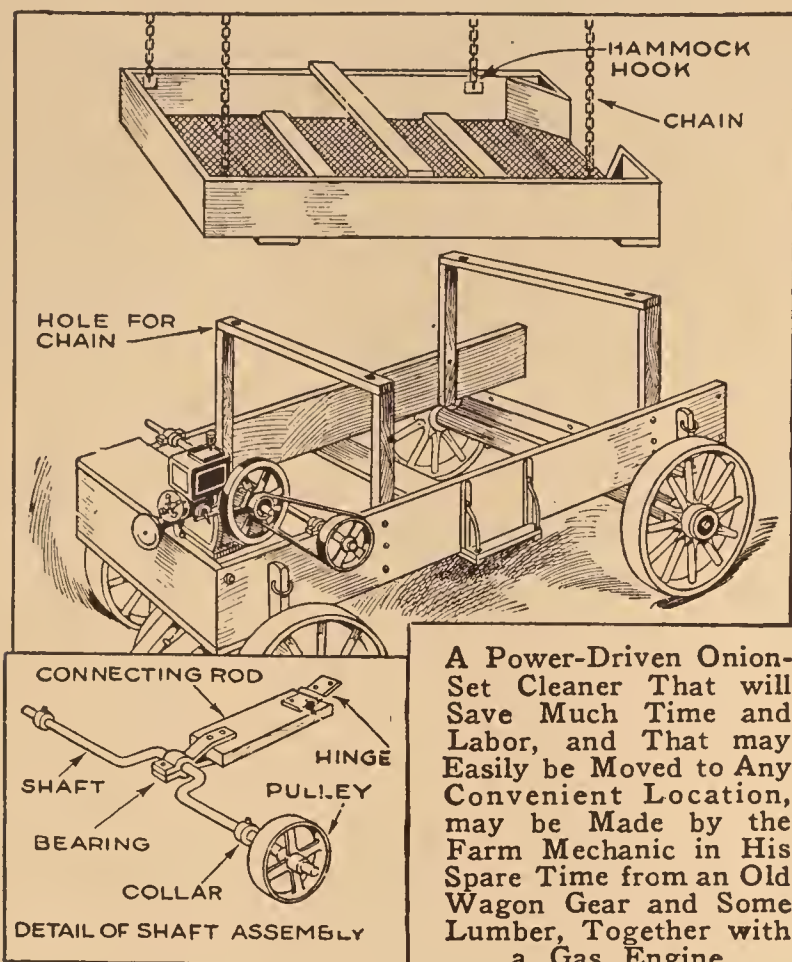
hole from the bottom of the base, and run on a locknut to hold it securely in position. Then put on the roller, and pin it to the bolt through the small hole. Be sure the roller points exactly toward one side of the base, and then lock the bolt in that position. Connect the bolt head to a large binding post in the base, just forward of the roller; this is the ground-wire post. Paint an arrow pointing from this post toward the center. Drill a hole, to fit the bolt, through the shell, place it in position, and run a pencil around it to mark its outline on the base. Scribe a second circle inside the first, $\frac{1}{8}$ in. away from it. A circular groove, $\frac{1}{8}$ in. deep, is cut out to serve as a track for the edge of the shell. Cut a wooden handle to fit over the timer-rod arm, and bolt it in position. Paint numerals on the shell in the order shown, opposite the terminals. Finally, slip the shell over the bolt, put on a spring washer, and run on the nut, turning the latter down just enough to hold the shell in the track and allow it to be turned around easily with the handle. Fasten the base to the table, or bench, and drill a hole in it, one on each side of the base.

Connect flexible cords to the timer terminals, allowing plenty of slack, and run them through the holes, where they are looped over the weighted pulley shown. Each cord is then fastened to the underside of the bench. Set a knife switch in the ground line beyond the base.

To operate, open the ground switch, swing the number of the circuit desired around toward the arrow, throw in the switch again, and only that circuit will be in operation.—L. B. Robbins, Harwich, Massachusetts.

Cleaner for Onion Sets

In some parts of the country, where onion sets are grown commercially, the customary method of cleaning them for



A Power-Driven Onion-Set Cleaner That will Save Much Time and Labor, and That may Easily be Moved to Any Convenient Location, may be Made by the Farm Mechanic in His Spare Time from an Old Wagon Gear and Some Lumber, Together with a Gas Engine

the market consists in running them through hand sieves, at the expense of much time and labor.

A power-driven machine that can be moved about to any location only requires the uncleaned sets to be placed in one end of the cleaner, the cleaned bulbs being caught at the rear of the device and removed.

A bottomless box, mounted on a low wagon gear, has a suitable crosspiece at the front end for bolting the small gas engine used. A similar, though somewhat smaller, box, as shown in the sketch, is provided with a screen bottom to form the sieve, or shaker. To each of the four corners of the shaker, a hammock hook is attached as shown, and a short length of link chain is provided for each hook. The shaker is supported from horizontal pieces, which are fastened to the uprights on the wagon box. Holes are drilled in the crosspieces, through which the chains are inserted and held in place with a long spike, so that the shaker can be made adjustable. In use, the open end of the shaker should be at a lower level than the closed end into which the sets are dumped.

A stout wooden brace is bolted securely across the shaker near the closed end, and this is connected to the wooden connecting rod by means of a heavy strap

hinge, which is attached to both members by bolts. The opposite end of the connecting rod is fitted with a plain bearing, made of flat iron, for the crankshaft.

The crankshaft is made from round steel, and must be true and properly balanced, otherwise the shaft will cause vibration that would be troublesome. Provision is also made for attaching a pulley to the crankshaft to take the power from the engine, a belt being used.

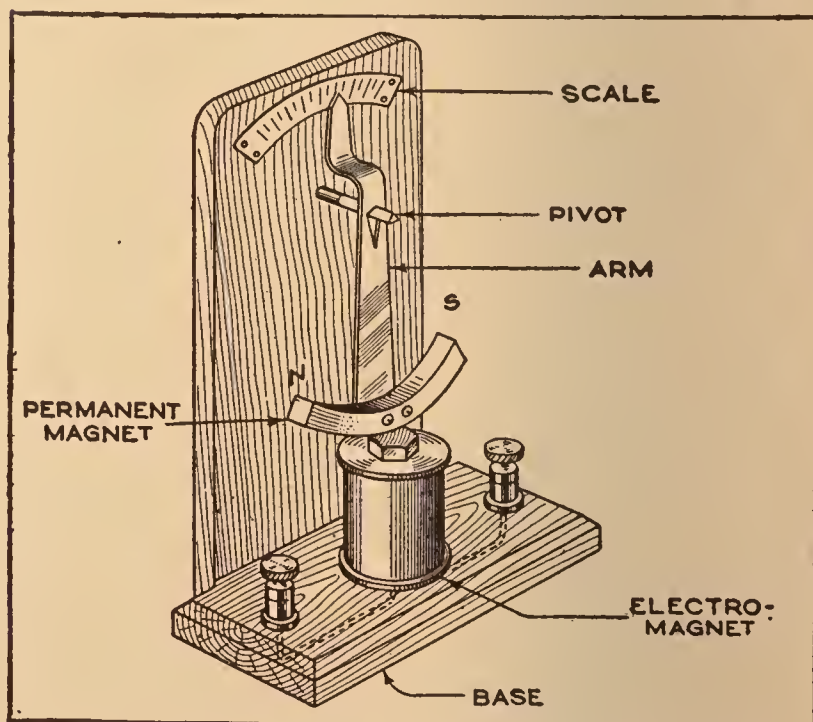
Plain bearings are bolted to the sides of the wagon box for the crankshaft, and collars are provided on the outside of the bearings to prevent sideplay in the shaft.

One or more strips of wood are placed across the bottom of the shaker, so that they will be above the surface of the screen and offer a barrier to the too rapid passage of the sets down the inclined plane.—George L. Emerson, Chicago, Ill.

How to Make a Simple Ammeter

Sometimes, for experimental purposes or in order to get a rough idea of comparative amounts of current flowing through a circuit, a simple ammeter is necessary; where a regular ammeter is not available, the one shown in the drawing will answer all requirements.

It is based on the well-known physical



A Homemade Ammeter by Means of Which the Electrical Experimenter Is Able to Make Reasonably Accurate Readings of the Amount of Current Flowing through a Circuit

principle that an electromagnet will attract either the north or south pole of a permanent magnet, according to the direction in which the current is flowing through the electromagnet.

Make a suitable wooden base and attach to one edge an upright board, about 6 by 10 in. In the center of the base, and close

to the vertical piece at the back, place an electromagnet, either bought for the purpose or made by winding a number of turns of wire around an iron bolt; this need not be elaborate so long as it creates magnetism.

Next, cut out an arm about 6 in. long, of stiff brass; point one end and cut an opening in the arm, wide enough, and of such a shape as to permit the arm to swing without sliding, 4 in. from the lower end. The bottom, or blunt end, of the pointer is fastened to the center of a piece of magnetized steel, formed in the shape of an arc with a 4-in. radius. Then hang the arm in position by placing the slot over a screw driven into the back board, in such a position that the steel magnet will swing about $\frac{1}{8}$ in. above the coil. The screw should have its top surface filed down to a knife-edge so that the pointer can swing with the least possible amount of friction.

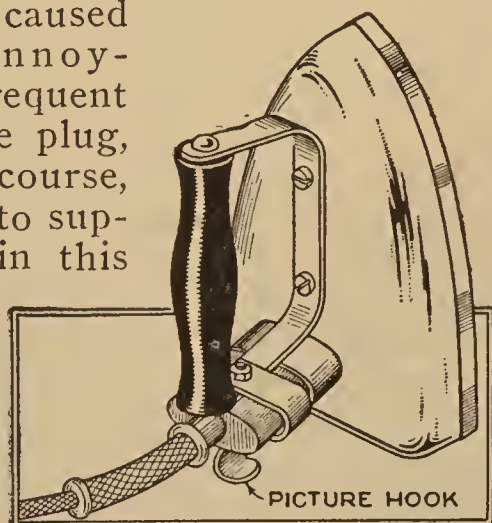
Connect the electromagnet to the two binding posts and then make a scale which can be tacked to the back under the end of the pointer. The instrument should be tested with a regular ammeter and the readings marked accordingly on the scale.

When using, set the instrument in a steady position so that the pointer will be at the center of zero point of the scale, and connect the magnet to the source of current; the action of the electromagnet will then pull one end or the other of the magnet down to it, which will swing the pointer either to the right or left and indicate the amount of current.—L. B. Robbins, Harwich, Mass.

Stand for an Electric Iron

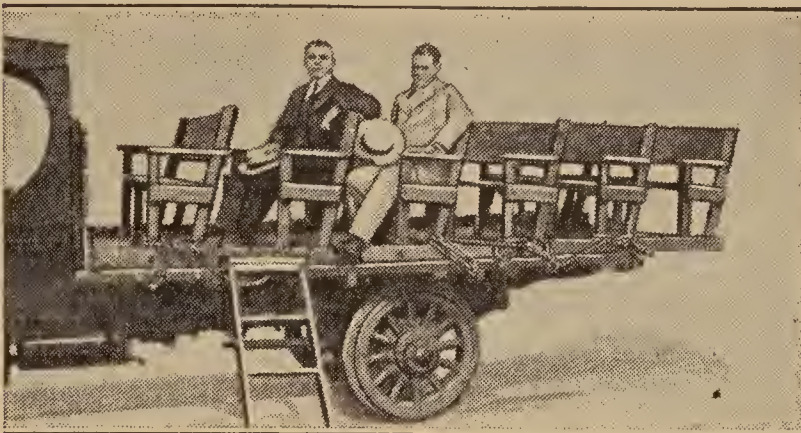
An electric iron that was not provided with any form of stand for upending while heating, caused considerable annoyance through frequent breakage of the plug, which was, of course, never intended to support the iron in this manner.

The cause of the trouble was quickly eliminated by drilling a hole in the rear handle support and bolting a simple guard to it in the manner indicated. For this purpose an ordinary brass hanger, such as used to hang pictures, was found to answer very well.



Detachable Seat Unit for Trucks

Every owner of a motor truck has a potential "rubberneck wagon," with which



Every Owner of a Motor Truck can Convert His Vehicle into a Passenger-Carrying "Rubberneck Wagon" for the Conveyance of Sight-Seers and Outing Parties

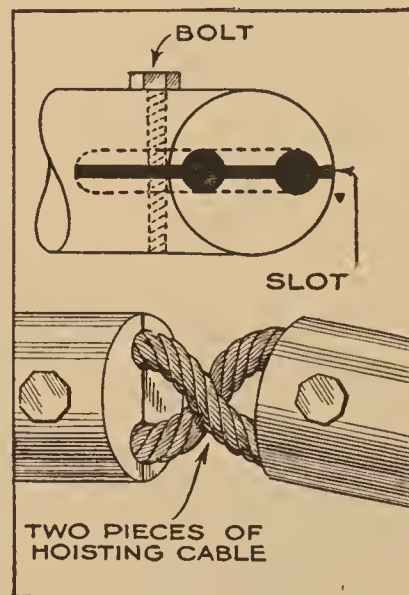
he can earn extra money by hauling outing and sight-seeing parties.

The photograph shows a detachable seat unit which is set on the regular truck body as the occasion may demand. The whole arrangement is made of wood bolted together and lashed to the body with ropes, although a neater effect would be obtained by using bolts. In figuring the seating capacity, 18 in. should be allowed for each passenger.—Geo. B. Morris, Pasadena, Calif.

An Emergency Universal Coupling

Having need of a universal coupling, I made one by connecting the ends of two shafts with short lengths of wire hoisting cable.

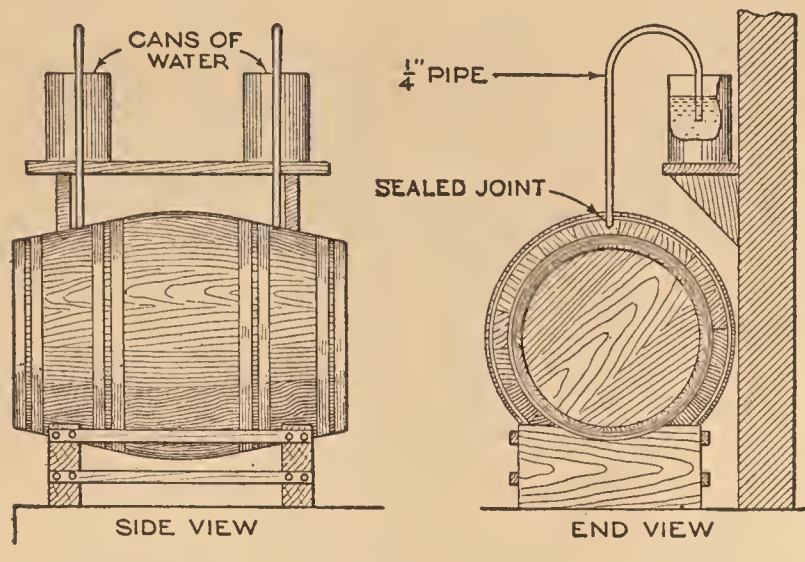
This was done by drilling holes in the ends of the shafts, as indicated, and then slitting through the centers of the holes with a hacksaw. A tapped hole in each shaft was fitted with a setscrew for tightening up the cables, as shown in the drawing.



The cable should be lubricated with graphite grease. This may be done by untwisting the cable slightly, before assembling, and forcing the grease between the strands. This will aid materially in lengthening the life of the coupling, and in decreasing the possibility of breakage when used in locations where it may be exposed to rust.—Irvin T. Fox, Richmond, Ind.

Keeping Cider Barrels Air-Tight

Anyone familiar with the action of cider, and similar fruit juices, knows how important it is to use care in permitting



A Simple Method of Keeping Air from Spoiling Cider, and Similar Fruit Juices, Utilizes an Easily Made Water Seal, Which Permits the Gases within the Barrel to Escape Freely without Admitting Air

the gas developed by the initial fermentation to escape, without admission of air, if the product is to be kept in good condition.

The simplest method of doing this is shown in the drawing. Place the barrel on its side, as indicated, and drill a hole in the side near each end; insert a short length of $\frac{1}{4}$ -in. pipe into each hole, and make the joints air-tight with melted paraffin or sealing wax. The outer ends of the tubes are submerged under water in the manner shown. The pressure which develops inside the barrel will be strong enough to force the gas out through the water, but none of the outer air can get in. Barrels of cider can be kept for long periods in good condition without blowing up or turning into vinegar by this method.—L. H. Georger, Buffalo, N. Y.

Laying Oak Flooring

Oak flooring should never be laid in a new building while the walls and plaster are damp; in fact, it should be the last thing installed in a house. It is most important that brick, stone, concrete, and all similar materials, be dry before the flooring is laid.

In winter building, flooring should never be laid without heating the rooms, as trouble will be encountered, due to dampness, should this be neglected; where $\frac{3}{8}$ -in. flooring is laid during the summer months, with the first chill or dampness, the rooms should be heated at least once each week. This is particularly necessary with this thin flooring, as it is subject to

greater shrinkage than the $\frac{13}{16}$ -in. material. Through prolonged cold, wet spells, during any season, heat should be introduced into the rooms at least once a week. A subfloor should be used under both $\frac{13}{16}$ and $\frac{3}{8}$ -in. thicknesses; this should be reasonably dry and laid diagonally. Ship-lap, 6 or 8 in. wide, is preferred. It should not be put down too tight, and should be thoroughly dried and cleaned before the oak flooring is laid.

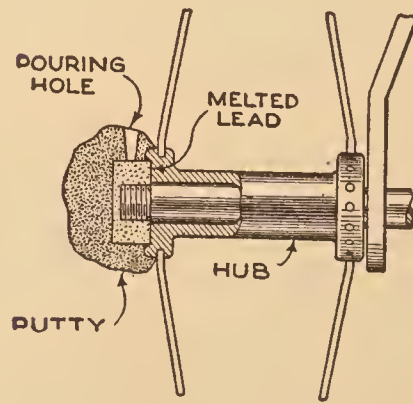
It is well to use damp-proof paper between the oak and the subfloor. This must not be ordinary building paper, or resin-sized stock; only a small quantity is required, and the very best damp-proof stock should be used.

Allow about $\frac{1}{2}$ in. space on all sides between oak flooring and the baseboard, to allow for expansion, should any dampness later get into the floor. This space is covered by the base molding.

All tongued-and-grooved flooring should be blind-nailed, using eight-penny steel-cut flooring nails for $\frac{13}{16}$ -in. stock; for $\frac{3}{8}$ -in., use three-penny cement-coated wire finishing nails. The maximum distance between nails for $\frac{3}{8}$ -in. flooring should be 8 in.; for $\frac{13}{16}$ -in. stock, 16 in.; and care should be used in nailing.

An Emergency Left-Hand Nut

Trying to obtain a left-hand nut from the usual sources of supply is usually of no avail, for the average hardware store does not carry such an article, and it requires a left-hand tap, or a lathe, and considerable mechanical skill, to turn a left-hand internal thread.



The drawing shows how an emergency nut was made for the left-hand axle of a baby carriage, from which both the nut and protector cap had been lost. A piece of putty was formed over the nut on the right side, and this improvised mold was set up over the threaded end of the left axle from which the nut was missing. A small amount of melted lead was then run into the cavity around the end of the axle, and formed a very serviceable nut. A tin cap was fashioned to conceal it, as on the other wheels, and the makeshift repair answered all requirements until the youngster no longer cared to ride in his carriage.—Frank W. Bentley, Jr., Missouri Valley, Ia.



By James Tate

Part I—Flower Boxes and Vases

PERMANENT flower vases, urns, and boxes of concrete are easily made by the home worker. The materials required are not expensive, and, by choosing simple designs, and exercising reasonable care, many pleasing effects may be secured.

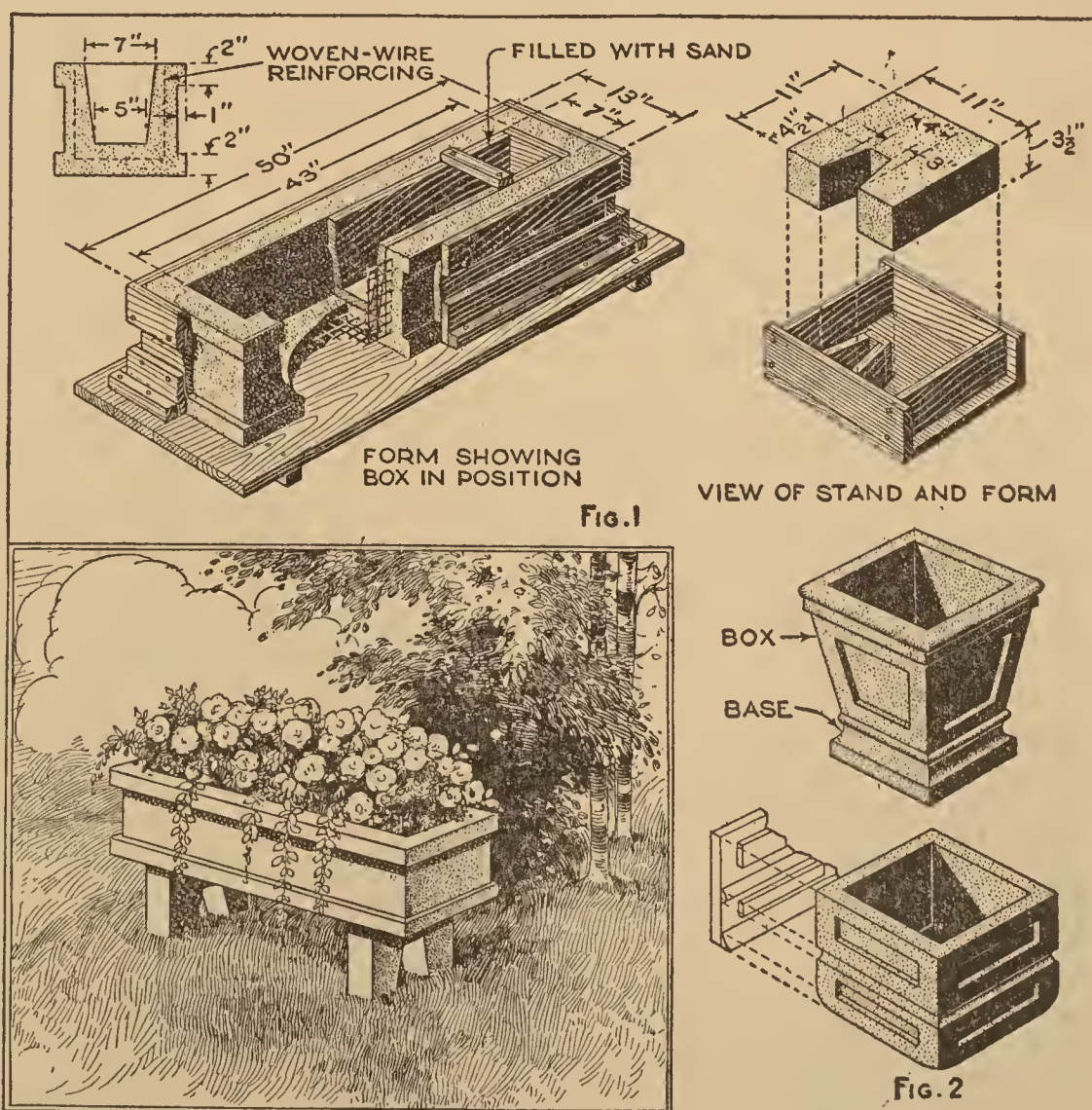
The easiest method of molding a simple flower box is by using a wooden mold. This is built as shown in Fig. 1, 1-in. boards being used for the form. The form is made like a box without top or bottom, and is placed on a foundation board, being held in position by a cleat screwed to the board, at each end of the form. The interior of the form should be oiled or greased, or at least well wetted, before any concrete is placed in it.

When filling the box form, first place a 1½-in. layer of concrete in the bottom, then put in the reinforcing; this is ½-in. mesh, No. 20 galvanized-wire lath, and is procurable at most hardware stores. It is bent up on the sides and ends as indicated. Next fill in more concrete so that the bottom is about 3 in. thick. The inside form is then placed in position, centered, and filled with sand, to prevent its collapsing under the pressure, and the remainder of the concrete poured. The concrete used throughout this job should be a mixture of one part cement to two parts sand. The pouring of the cement in the stand form is performed in a similar man-

ner, except that the reinforcing may be omitted, if desired.

Remove the forms in about 24 hours and paint the pieces all over with a cement and water mixture. To erect, place the stands in position at the proper distance apart, and set the box on them, using a mortar of cement to bond the stands to the box bottom.

Simple vases, square or rectangular, without stands, of designs similar to those shown in Fig. 2, are made in forms as described for the making of the box. The panels in the upper design are made, as indicated for the lower one, by blocks of



Simple Boxes or Vases of Rectangular Section Are the Easiest Forms for the Beginner. They are Cast in Wooden Molds, Which may be Used Repeatedly. Figure 2 Shows How Panels are Made by Blocks Nailed to the Form

suitable size nailed to the form. Molding, half-round or quarter-round, may also be utilized in forming rounded sections on the pieces.

There are several methods of making vases and urns having curved outlines; this article will, however, be confined to the simplest methods and designs, while more elaborate methods will be taken up in succeeding articles.

The easiest method of making a vase such as shown in Fig. 3, is by means of a template, or "sweep," and the first step consists in making the core that forms the inside of the vase. The vase itself is shown half in section and half in elevation in the upper left-hand corner.

First make the foundation board. This should be of 1-in. lumber, well braced, and about 2 ft. 6 in. square. An old door will answer, if the surface is perfectly flat and the joints tight. In the center of the board, screw a $\frac{1}{2}$ -in. floor flange, and into the flange a length of $\frac{1}{2}$ -in. pipe, cut to the same length as the intended depth of the core. The top end of the pipe is fitted with a hardwood bushing, drilled to receive a pin on the template. The template is made of $\frac{3}{4}$ -in. boards, as shown, cut to the required taper of the core, and faced with a piece of galvanized iron, projecting $\frac{1}{8}$ in. from the edge of the template. This forms a cutting edge, and the template is beveled back of it, as shown in the section A-B. Exactly at half the core diameter, as measured from the edge of the galvanized iron, either drill a hole in the edge of the template and drive in a pin to fit the hole in the pipe bushing, or fasten the pin by means of a strap and by bending the galvanized iron over it, so that the center of the pin is exactly on the edge of the template. The latter is the better method, and is the one shown in the drawing. In order to economize cement, build up around the pipe, which is first coated with oil or grease, with broken rock, bricks, or any similar material, bonding them with a little cement, if necessary. This should form the bulk of the core. Then mix one part cement with two parts sand as before, drop the template into place, give it a turn to see that none of the rough core strikes it anywhere, and proceed to lay on the cement.

This should be liquid enough to percolate through the stone mass, but not thin enough to run all over the board. Plaster it well over the sides, building from the bottom upward, and as it comes near the required diameter, commence turning the template around; this will form the surface. The template must be

pressed to the foundation board, which should be kept clean. During the last stages, thin the concrete a little, and pour it over the core from the top, always keeping the template on the move, and keeping the edges of the latter free from hardening cement. The finished core should be left on the board until thoroughly dry, and then be given two or three coats of shellac.

While it is drying, proceed to make the template for the outside of the vase. This is made in a similar manner to the one for the core, half the pattern of the outside being used, and, as the galvanized iron forms the true template, too much care need not be taken in cutting out the wooden frame.

Unscrew the pipe from the core and screw a longer one into place, the exact length of the vase, lifting off the core, if necessary, before unscrewing the pipe. When the shellac has hardened on the core, give it a coat of paraffin, or heavy oil. Plaster on concrete until it is as heavy as half the desired thickness of the wall, then place the previously prepared reinforcing on the concrete. This reinforcing should be placed so as to support the overhanging portions of the vase, such as the base, and may be prepared in either of the two ways shown in the drawing. One side of the reinforcing shown is made of twisted galvanized wire, the other is made of wire lath, such as used for the flower box in Fig. 1. The drawing is made as shown merely to illustrate the two methods of reinforcing, and must not be followed literally. If wire mesh is used, make the entire reinforcing of mesh, bracing it with hoops made of wire, and similarly with the twisted-wire reinforcing, which may be held to the hoops as illustrated in the enlarged detail.

Spread the concrete over the reinforcing and proceed to build upward, dropping the template into place as the diameter approaches the desired size, and keep on building and turning the template as described for the core. When nearly completed, thin down the concrete with water until it is more pasty than before; this will smooth up better and make a somewhat finer surface.

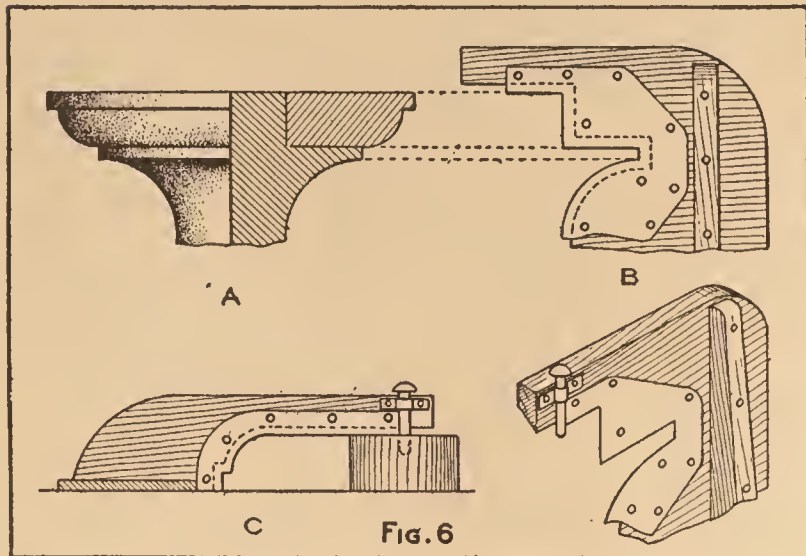
Instead of the pipe as a center support, a piece of 1-in. square hardwood, tenoned into the base, may be used. This is shown in the lower right-hand corner of Fig. 3. The pipe is a little more substantial; the results obtained by using either support will, however, be the same.

If any difficulty is met with in making the base, that is, if trouble is encountered



The Various Tools, Forms, and Methods Used in Making Circular Urns and Vases by the Template Process are Shown in Detail in This Illustration. The Designs Chosen are Well Adapted to This Process, the Square Bases Shown in Designs B and C, Figure 4, being Cast Separately in Simple Wooden Molds. Figures 3 and 5 Show Alternative Methods of Using the Templates, the Only Difference Being in the Method of Application

in holding the concrete up while forming, it may be made separately, as shown in Fig. 6. The main former or template will then be as at B, the base template as at C,



One Method of Forming the Base. Where Difficulty is Encountered in Making the Vase in One Piece

the hole in the base being formed by a circular block of wood, in the center of which the pin turns. The base and vase can afterward be joined as shown at A by a good cement mortar.

Figure 4 shows a number of pleasing, yet simple, designs. The square bases of B and C may be cast in a wooden box mold, being assembled as shown at F.

Another method, especially applicable to designs such as shown at E, Fig. 4, consists in rotating the work against a stationary template. A wire-mesh frame is made, upon which is plastered a roughing coat of one part cement to two parts sand, together with some plasterers' hair. The

last can be purchased at any plasterers' supply house. Do not get the mixture too wet, just wet enough to squeeze through the holes in the wire mesh. Cover both sides and bottom of the frame, leaving the surface rough; then let the cement set.

A good mixture for the finishing coat consists of one part cement to two parts marble dust, mixed to a heavy paste.

The cement-covered form or frame is placed upon the center of the turntable, as in Fig. 5, and a nail is driven through the work and into the table; next, the template is moved up into contact with the turntable and fastened by means of pegs, then the finishing coat is plastered on, all the while rotating the table, and with it the work. Before putting on this coat, rough up the first coat with a sharp-pointed tool, and wet thoroughly.

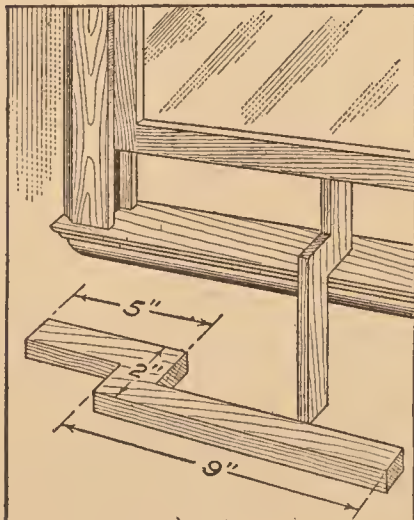
When the outer surface has been formed, a horizontal piece of wood, edged with galvanized iron, is bolted or screwed to the template at the proper height, and the top edge of the vase trued, then another piece, to form the inside of the vase, is attached to the horizontal strip, as shown in the drawing.

The bottom may be trued by holding a piece of wood as shown, and revolving the work.

The finishing coat, of cement and marble dust, spoken of in connection with the last example, may be used with any of the pieces made by the template method. This forms a surface that is light, and full of sparkle when dry, presenting a very pleasing appearance.

A Convenient Window Stick

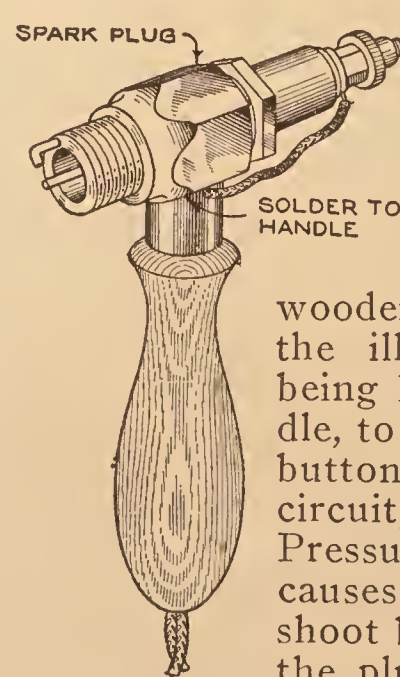
On nights when the wind is blowing hard and the occupants of a bedroom do



not want the window raised as high as when the air is still, the window stick shown in the drawing meets all requirements. By sawing the stick from a piece of 1-in. board to the dimensions indicated, the window can be raised to five different heights without a separate piece for each height. The dimensions given can, of course, be altered to conform to individual requirements, while keeping to the same design.

A Spark-Plug Cigar Lighter

An electrical-supply house devised a novel means of at once serving their customers and advertising a spark plug,



by using a sample plug as a cigar lighter. The plug is soldered to the brass ferrule of a wooden handle, as shown in the illustration, the wires being led, through the handle, to a spark coil. A push button was connected in the circuit, within easy reach. Pressure on the button causes a stream of sparks to shoot between the points on the plug; while the button is depressed, the cigar is lit by being pressed between the points.

Reclaiming Tennis Balls

With the opening of the tennis season, the problem of furnishing balls confronts the players. Players and dealers always have a number of "dead" balls on hand which can be reclaimed at a very small cost. They are made "live" again in much the same manner that a punctured bicycle tire is repaired.

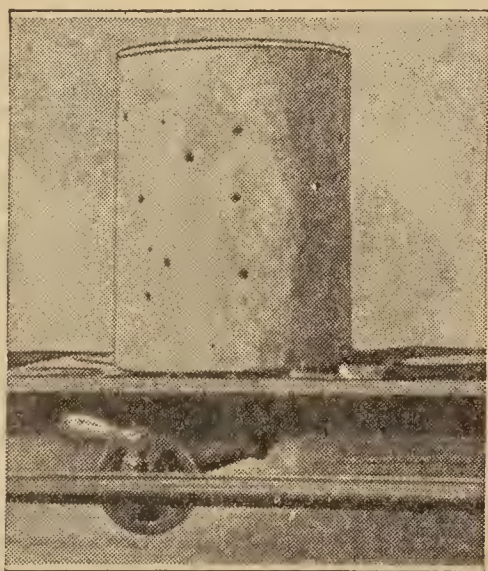
An old hypodermic syringe and needle, which can usually be obtained from a doctor for the asking, a tube of tire filler, and a bicycle pump constitute the necessary equipment for restoring the balls to usefulness.

Simply fill the hypodermic syringe with the tire-filler compound, then puncture the ball casing with the needle, and squirt the compound into the hollow interior. All the balls can be treated before passing to the next operation and, in fact, it is desirable that the compound should be allowed to harden slightly.

The piston is removed from the hypodermic syringe, and the barrel is connected to the bicycle pump by means of rubber tubing; the needle is again inserted into the ball, and on operating the pump, the ball is inflated to any desired pressure. On withdrawing the needle the puncture-proof compound fills up the minute needle hole, and holds the pressure inside the ball. The fluid is allowed to harden, after which the ball is ready for use.—Hale Little, Oak Park, Ill.

An Improvised Heater

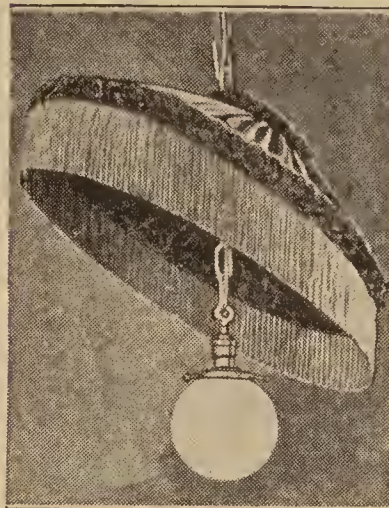
A very satisfactory heater for taking the early-morning chill from the kitchen can be made from an old can. A medium-sized can is selected, punched with holes, and inverted over one of the burners of the gas stove, or hot plate. A small room can be warmed very quickly by a heater of this sort.—Oden Liljegren Fern, South Pasadena, California.



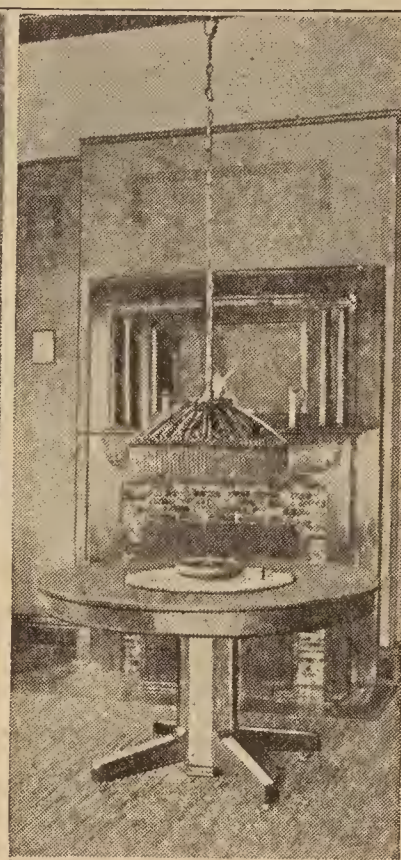
☐ When preheating a large casting for welding, always use a soaking heat.

An Inexpensive Lighting Fixture

Wishing to replace an inefficient dining-room electrolier with something more economical of current and better in



An Attractive and Easily Made Fixture Designed to Replace a Crude and Inefficient Dining-Room Electrolier: Long Screws are Used in the Globe Holder so That the Shade Frame may Rest upon Them; the Shade is Thus Easily Moved While Cleaning the Globe



appearance, the attractive and inexpensive fixture shown in the photographs was devised.

An artistic silk shade was made over a wire frame, and a globe holder was attached to the lamp socket to support the shade. It may be found necessary in some cases to retap the screw holes and insert longer and larger screws, so that the wire shade frame will rest upon the projecting ends.

The old fixture was taken down, and the new one, which is suspended from a brass fixture chain, was put up in its place so that the lower edge of the fringe would be about 16 in. above the table. A 75-watt nitrogen-filled lamp will be found to produce the most satisfactory results.—L. H. Georger, Buffalo, N. Y.

Cleaning Old Paintbrushes

Many amateur painters and others accumulate a number of brushes that have become hard because the water or turpentine in which they were set away has evaporated.

Soaking in benzine or gasoline gives but poor results, but the brushes may be restored to good condition by soaking for a few hours in paint remover, then scraping off the surface paint, and finally washing out with warm water and soap. This will not hurt the brushes and will remove all paint.



Part II — Pedestals and Bird Baths

THE methods of making wooden forms described in Part I, and illustrated in Figs. 1 and 2, may also be used in making the vase and pedestal shown in Fig. 7.

The forms for the top of the pedestal, or capital, and for the base, may be built up of molding sections, as shown; these moldings can be procured from any dealer in millwork; some forms of cap molding or plate-rail molding come in the shapes illustrated; if these are not easily obtainable, the form may be built up of simple sections; half-round molding, tapered and nailed to the sides of the pedestal - body form, will form the grooves.

The pedestal, base, and vase are preferably reinforced with wire mesh, and the pedestal may, by using a tapered wooden core, be cast hollow, thus saving material.

The whole piece may be cast as a unit, if desired, but if the cap, base, and pedestal are cast separately, they should be formed as shown in Fig. 6; this makes the unit much more solid than if the ends were merely left flat.

A number of designs for sundial pedestals and bird fountains are shown in Figs. 8 and 10. The bases and square capitals are cast in wooden molds, or made as shown in Fig. 11, by means of

a template working on the edge of a box.

A square bottomless box, of the desired size, is placed upon the foundation board; a template is cut from galvanized sheet iron, to the proper shape, and fastened to a wooden guide, as indicated. After the cement has been placed in the box, the template is moved along each side in turn, the material scraped off being carefully removed. This method may, of course, be applied also to the making of the caps and base in Fig. 7.

A simple method of placing the pedestals on the lawn is indicated at B, Fig. 8. A hole is cored in the base of the pedestal; when it is set in position, a post, driven into the ground and a neat fit in the pedestal hole, will hold the unit firmly in place.

The sundials used with the pedestals illustrated are not usually fastened in place, their

weight being sufficient to hold them in position, but for light dials, or where a permanent fastening is desired, four small holes may be made in the cap by inserting shellacked and oiled plugs into the soft concrete. The dial is then mounted as suggested in Fig. 9, the holes being filled with neat cement.

Little need be said about the bird bath and fountains shown in Figs. 10 and 12,

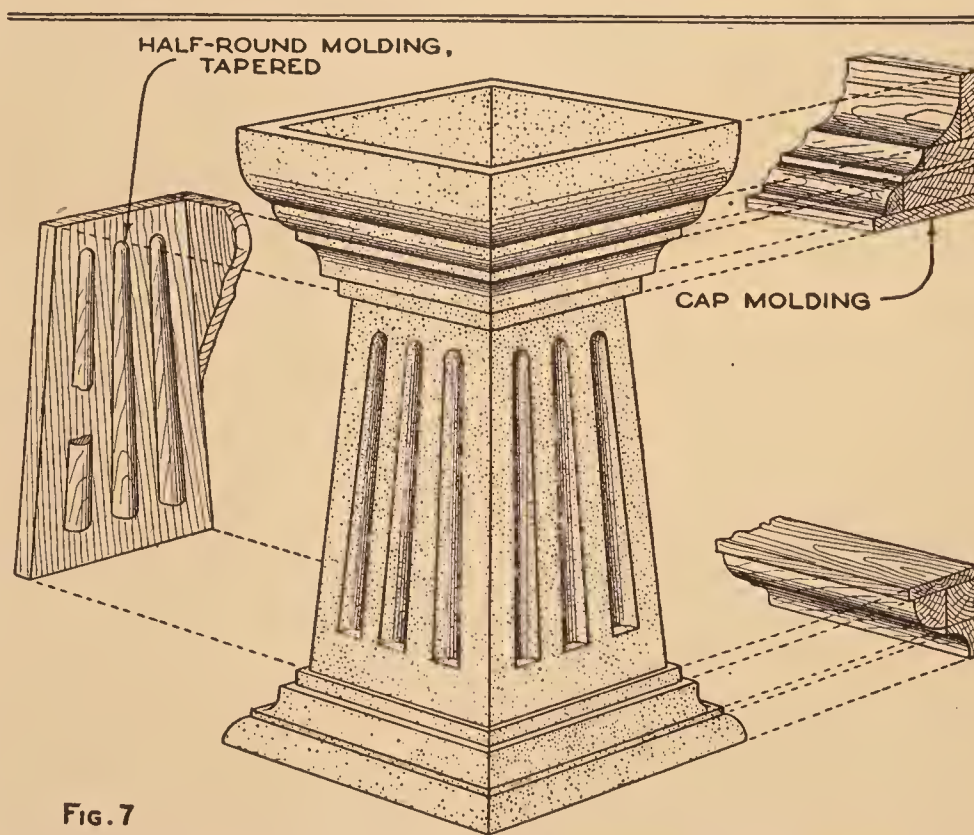


Fig. 7

Wooden Molds for Pedestals and Vases may be Built Up by Using Cap Molding or Simple Moldings, as Shown in This Illustration

except that the fountain in Fig. 10 and the pedestals of Fig. 12 should be made by the method shown in Fig. 3, Part I, while the small bird bath, the top of the table, and basin of the fountain in Fig. 12, can best be made by the fixed-template method illustrated in Fig. 5, Part I.

Where a vase, pedestal, bird bath, or any similar article is already at hand, and it is desired to duplicate it, the best method, if the design is not too elaborate and has no undercut portions, is to make a plaster mold.

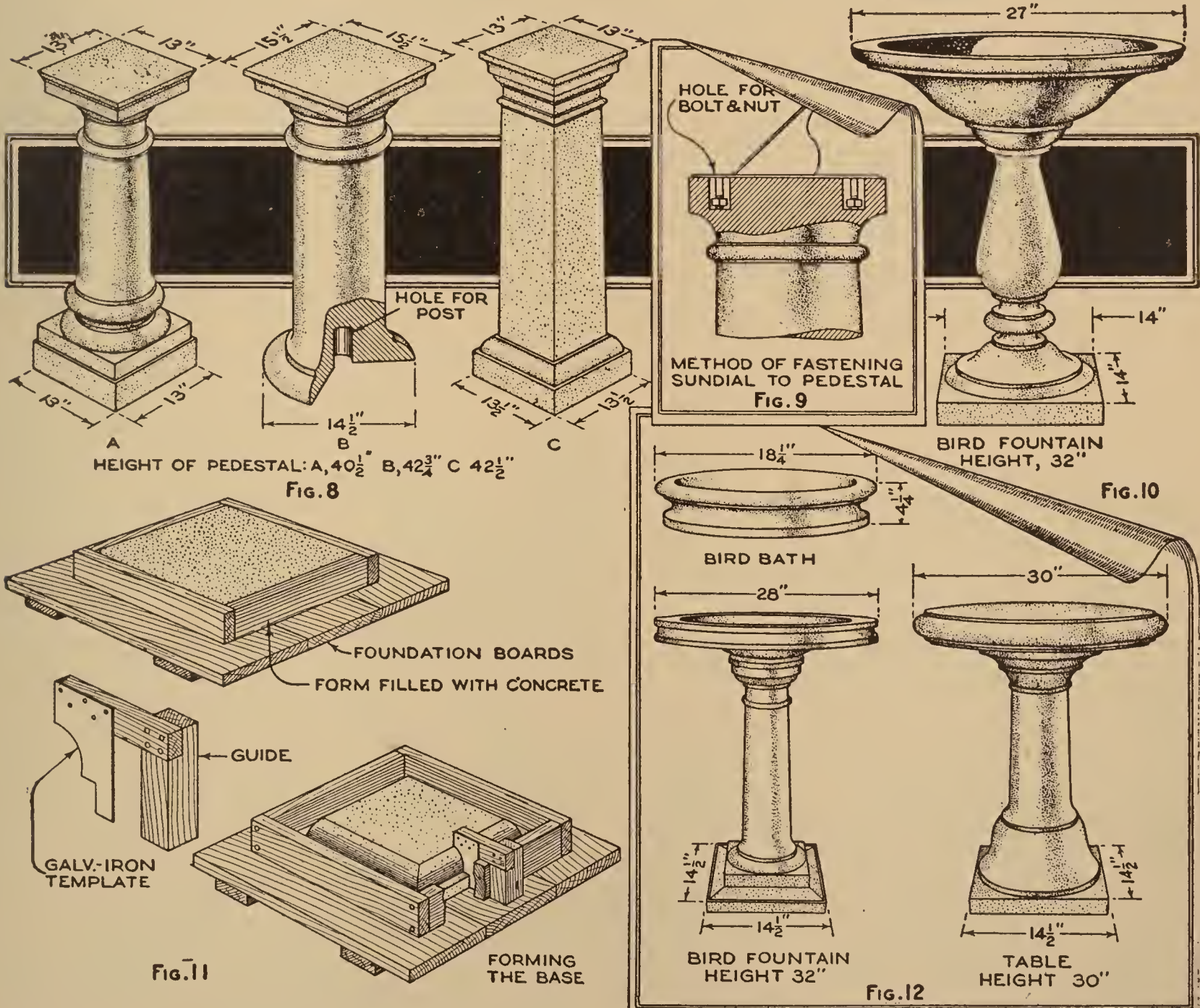
The making of plaster molds for elaborate pieces demands a great deal of experience. We will, therefore, choose only such designs as can easily be made by the amateur, commencing with a simple rectangular vase.

The vase shown in Fig. 13 can be made in a wooden mold; in fact, it would be advisable to make it this way, but it is convenient for illustration, and as a simple exercise for the beginner.

The materials needed are: fine casting plaster, moist modeling clay, stearin, a

good heavy-bodied oil, such as lard oil, some loosely woven burlap, and orange-shellac varnish.

Shellac the vase, inside and out, two or three coats, permitting each coat to harden before applying the next, then set the vase on the foundation board. Build up, on diagonally opposite corners, with the modeling clay, as shown, making one face of each wall straight. Dissolve some stearin in kerosene, and apply a thin coat to the vase faces; coat the clay walls and foundation boards with the oil, then mix up the plaster. This should be mixed by first filling a wide basin with water, then taking up the plaster in double handfuls and sifting between the fingers into the water. Some judgment as to the amount mixed and the proper consistency is necessary; 11 cups of plaster to 7 cups of water is about the right proportion. Build the plaster onto the vase, as shown in the plan, and allow it to harden. When it has hardened, remove the clay and scrape two holes, about $\frac{1}{2}$ in. deep and $\frac{1}{2}$ in. in



Various Designs for Sundial Pedestals, Bird Baths, and Fountains are Shown in Figures 8, 10, and 12. Figure 9 Illustrates a Method of Fastening Sundials to Pedestals; Figure 11, Molding Bases by the Template Method

diameter, on each end face of the half mold. These are known as "joggles," or "joggle holes," and when the other half

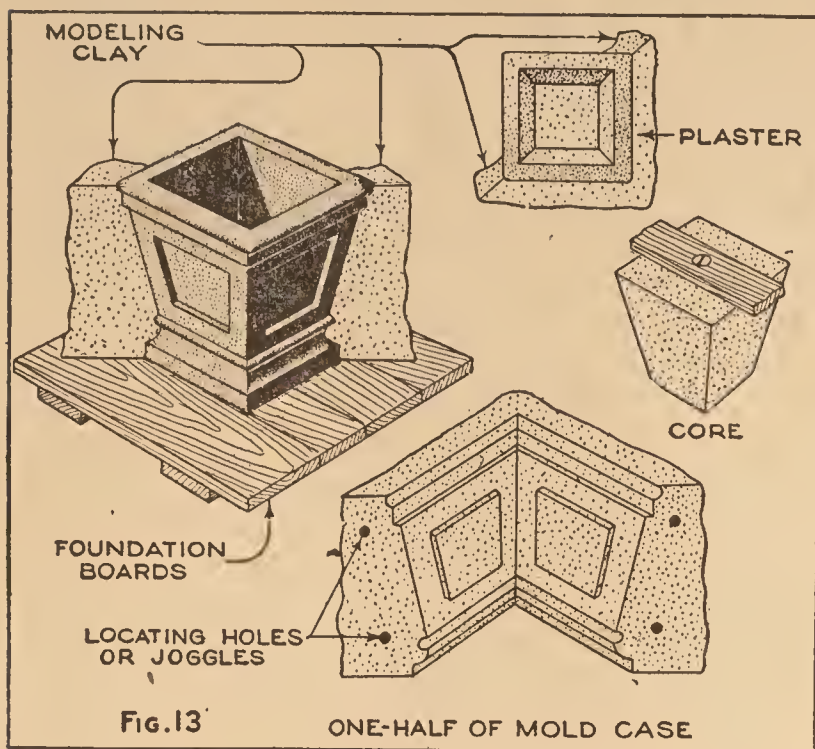


Fig. 13 The Making of a Simple Plaster Mold for a Rectangular Vase: This Is a Good Exercise for the Amateur Concrete Worker

of the mold is cast, small projections fit into the holes, thus locating the halves accurately.

Shellac and oil the exposed edges of the half case, and then plaster on over the remaining sides of the vase, to form the other half of the mold. Coat the inside of the vase with stearin and fill with plaster, then lay a strip of wood, with a woodscrew in the center, across the center of the vase, sinking the screw down into the soft plaster. This will form the core of the mold. The core may, if de-

sired, be made of wood, well shellacked. When choosing designs to copy, it is well to pick one having the interior well tapered, so that the core may be made in one piece. If the plaster mold is to be used for many pieces, it should be reinforced with burlap. This is cut into two lengths, each a little shorter than the length of two sides of the vase, and somewhat narrower than its height.

When the plaster is applied to the vase, to about half the thickness of the case, one of the lengths of burlap is dipped into the plaster and applied to the case; the remaining portion of the plaster is then applied over the burlap to the proper thickness. This strengthens the case considerably.

When the core and casing have hardened, give them two coats of shellac, then a light coat of stearin, and assemble them on the foundation boards. The two halves of the mold may be held by dipping strips of burlap in a thin plaster mixture and pasting them over the corners of the case. These, when hard, will hold the case firmly. Suspend the core in the center of the case, by means of the wood strip, and pour in the concrete. When this has hardened, remove the burlap strips, pull out the core, and withdraw the case carefully. Cover the vase with wet cloths for two days, then place it in a tub, and keep it covered with water for several days.

Further instructions in making plaster molds will be given in the next installment.

Packing Fragile Goods in Straw

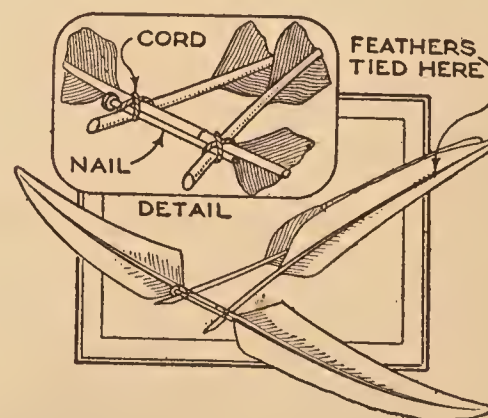
A Japanese method of packing fragile porcelain, and similar articles unaffected by moisture, involves the use of wet hay, or straw.

Long-strand straw is soaked overnight so that it will be soft and pliable. The strands are wrapped around each piece closely and tightly, the smaller pieces being gone over twice, and the larger ones three times in the same manner. Then the straw-wrapped articles are packed in boxes, or barrels, and the interstices are tightly stuffed with the same material.—Mrs. Chas. C. Neale, South Minneapolis, Minnesota.

☐ Rust stains on glass may be removed by rubbing with a rag dipped in a solution of seven parts muriatic acid in 30 parts water, to which a few drops of iodine have been added. Finally polish with a soft dry cloth.

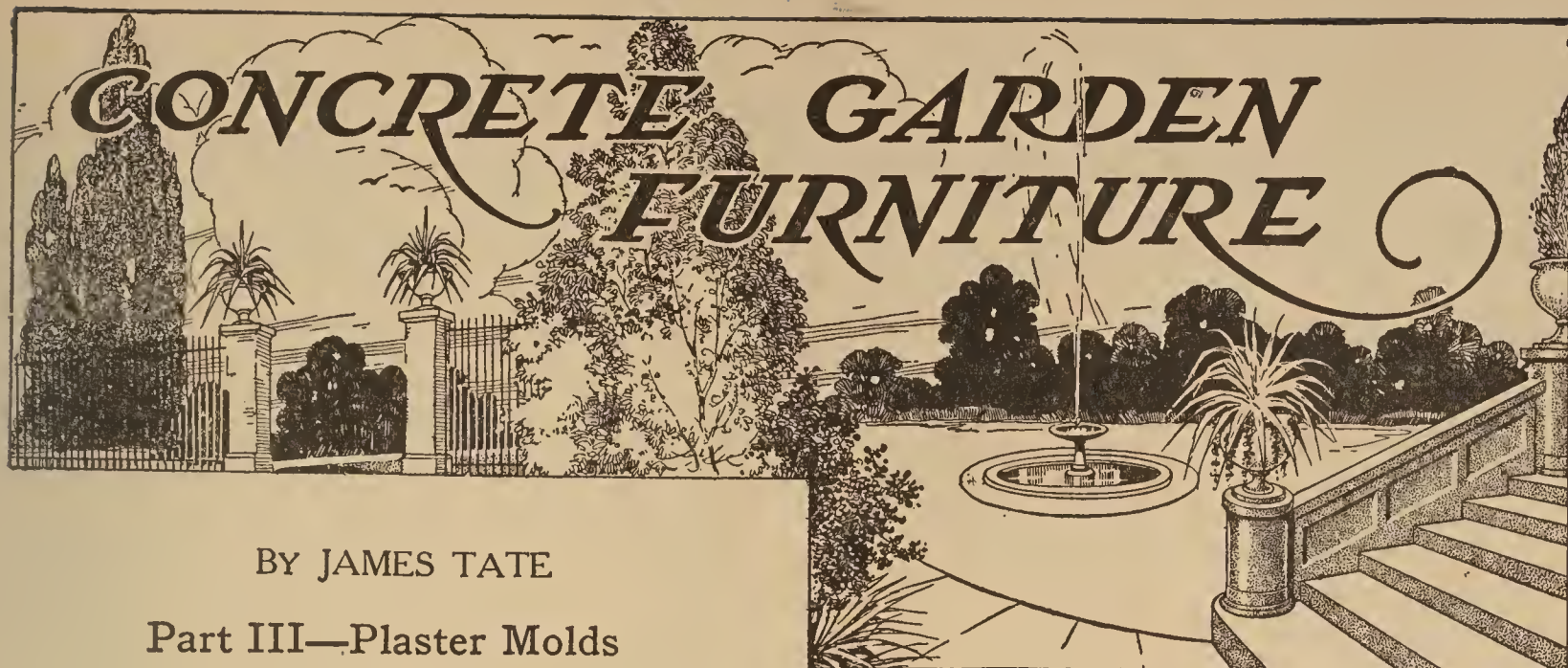
A Feather Airplane Dart

Four feathers, a nail, and some string are all the materials needed for making a glider that will fly gracefully through the air for considerable distances.



The feathers are cut and fitted together as shown in the drawing, the nail being placed horizontally in front of the wings, to keep the glider "trimmed."

The feather dart is shot in the same manner as a paper dart, and as the feathers are stronger, it will last much longer than the paper article.—J. E. Loucks, Cleveland, Ohio.



BY JAMES TATE

Part III—Plaster Molds

THE method of making models in plaster, of pedestals, balusters, and other objects of circular cross section, and of making a mold from the model, is very similar to the process of making plaster lamp bases, described on page 631 of the April, 1921, issue of Popular Mechanics.

It is better for the amateur, especially if he is doubtful of his ability to produce a neat and harmonious design, to procure a wooden baluster or column, shellac it well, and use it as a model on which to build his mold. Balusters or columns may be purchased, at a very small cost, from any dealer in millwork, and will save much work and time. Those who wish to work out their own designs, however, will be able to do so by following the instructions given in this article.

The first thing to do is, of course, to select the design. This should be as simple as possible, with no undercut portions

that would cause trouble in withdrawing the model from either the template or the mold.

Obtain a piece of galvanized sheet iron, about 6 in. wider than the largest radius of the design, and about 3 in. longer than its height. True up one edge, and, using this edge as a center line, lay out one-half of the design upon the sheet. With cold chisel and snips, cut out to the approximate shape of the design, finishing with fine half-round files.

This sheet-iron template is then mounted on a backing of 1-in. lumber, as shown in Fig. 14, in such a manner that the edge of the sheet iron will project from $\frac{1}{8}$ to $\frac{1}{4}$ in. from the wood, which should follow the outline of the design closely. This backs up the template. The latter, with its wooden backing, is then nailed to a stout box, as shown in the upper right-hand corner of Fig. 14, the

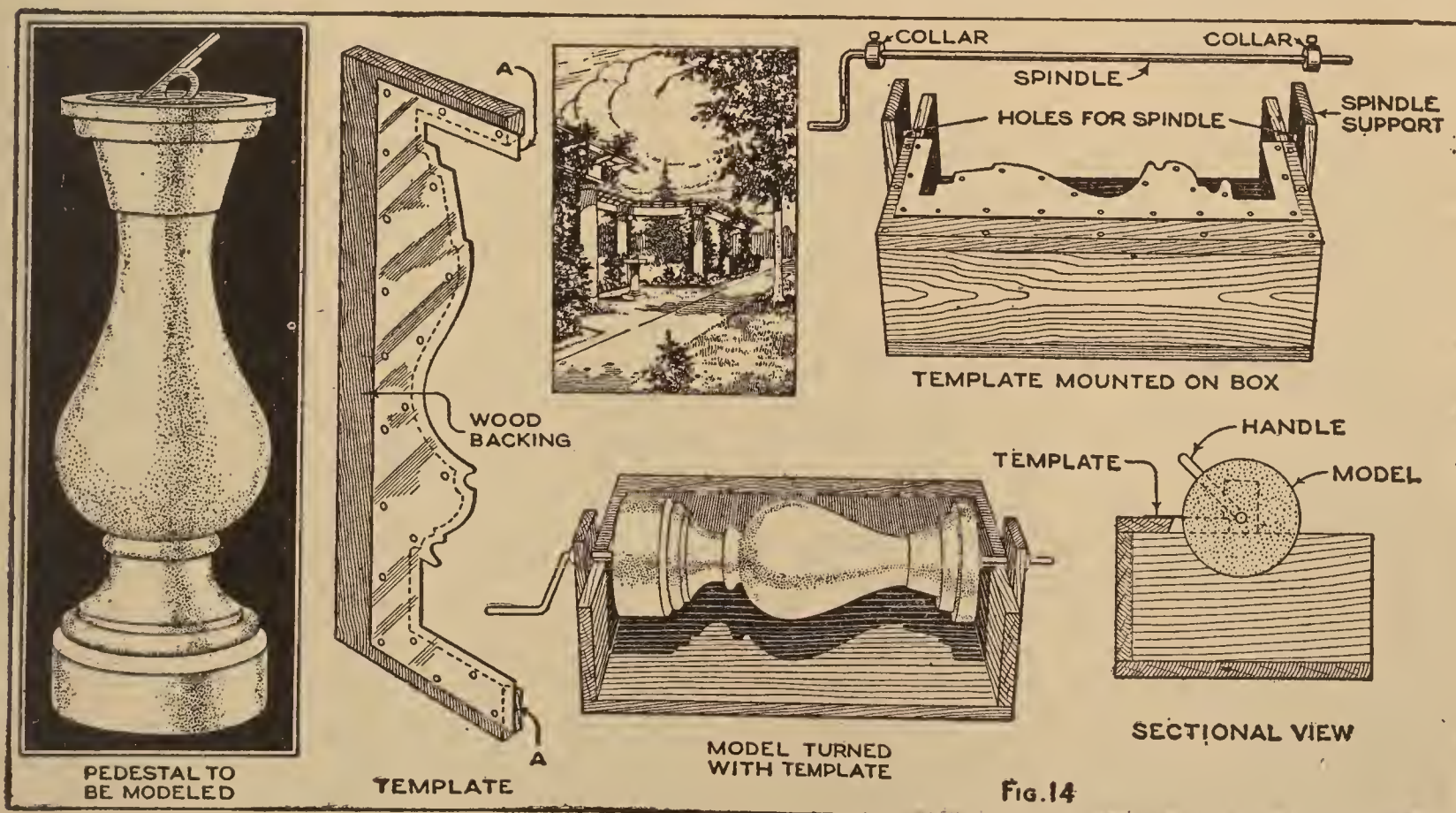


Fig. 14

While It Is Easy to Obtain Wooden Balusters and Columns from Which Molds may be Made, This Illustration Shows the Method of Originating Models in Plaster by Means of a Template

box being of sufficient depth to clear the largest portion of the design. A spindle, which may be either of light iron rod or pipe, is then made as shown and provided with collars, which bear against the spindle supports, or bearings, and prevent end motion.

The spindle supports are screwed in position, and holes to fit the spindle bored in them; the centers of these holes must be exactly in line with the edge of the sheet-iron template, and the spindle, when inserted, should bear against the template. When laying out the template, provision should be made for the diameter of the spindle; that is, as the center of the spindle will be the center of the finished model, the edges marked A on the template must be cut back for a distance equal to half the diameter of the spindle.

Set the spindle in place, adjusting the collars, so that, while allowing it to turn freely, there is no end motion; cut a piece of burlap, a couple of inches shorter than the design and about a foot in width, dip this in a thin plaster mixture, and wrap around the spindle, tying it with pieces of cord if necessary. This affords a good foundation for the plaster, and also reinforces it.

Mix fine casting plaster in water to a thick creamy consistency, and commence pouring over the burlap-wrapped spindle, at the same time turning the latter by means of the crank. As the plaster builds up, it will be shaved off by the template. When the model approaches completion, thin the plaster just a little.

When the model is completed, remove it by unscrewing the spindle supports, and set it aside to harden for about 24 hours.

At the end of this period, saw the spindle off close to the ends of the model, shellac the latter, two or three coats, allowing each coat to dry before applying the next, and it is ready to be used in making the mold.

The proper method of dividing a circular mold is shown in Fig. 15. If the mold is made in two pieces, one piece is quite likely to be a little larger than the other; that is, the division would not be exactly on the center line of the mold, so that one piece would embrace somewhat more than a half circle, making it impossible to withdraw the model without breaking the edges of the mold. By making the mold in three parts, the risk of such damage is eliminated.

Lay the model, or the wooden baluster, if this is employed, on its side. Build up, as shown in Fig. 16, two walls, or dams,

of modeling clay, about 2 in. square and about 120° apart. When these have set a little, coat both dams and the surface of the model between them with lard oil, then fill in between the dams with plaster to the same height as the clay, smoothing it off roughly on the outside. If desired, when the plaster has been poured on to about half the desired thickness, pieces of burlap may be used to reinforce it, as described for the making of the square-vase mold in the June installment.

Allow the plaster to harden thoroughly, then strip off the clay, build up another clay dam, 120° farther around, scrape out the "joggles," and shellac the exposed edge of the part of the case already cast. When dry, oil the dam, model, and edge of the first section, and pour on plaster to make the second section. When this, in its turn, has hardened, strip off the clay, cut the joggles, shellac and oil the exposed edges, and pour the third section. The plaster of each section may be carried over the end of the model if desired, as shown in Fig. 18, to form a bottom for the mold, although, if the mold is to be used on a good level foundation board, this is not absolutely necessary. When thoroughly hard, the mold is well shellacked on all surfaces, and is then ready to be assembled and filled with the mixture of one part cement, two parts sand, and three parts clean broken stone or gravel, which must not be larger than will pass through a $\frac{1}{4}$ -in. screen.

Another method of making molds, particularly applicable to designs with square caps or bases, or both, is shown in Figs. 19 to 22. A square base, of the same size as the bottom of the model, is first made, as shown in Fig. 19. Joggle holes, and a hole in the center for an iron reinforcing rod, are cut in this; when hard, it is then set up against the bottom of the model, which is laid on its side, and clay dams are built along the length of the model and base, the dams being shaped and placed as shown in Fig. 20. When the plaster for the first section has been poured and has hardened, the model is turned over, and the opposite side is treated in the same manner. Joggle holes are cut in the four exposed edges of the mold sections, the edges are shellacked and oiled, and the remaining sides poured. The form of two of the completed mold sections, the base, and reinforcing rod, are shown in Fig. 21, and the mold set up and in course of being filled in Fig. 22. When fastening the mold sections with wire, use L-shaped pieces of tin at the corners, to prevent the wire from cutting the mold.

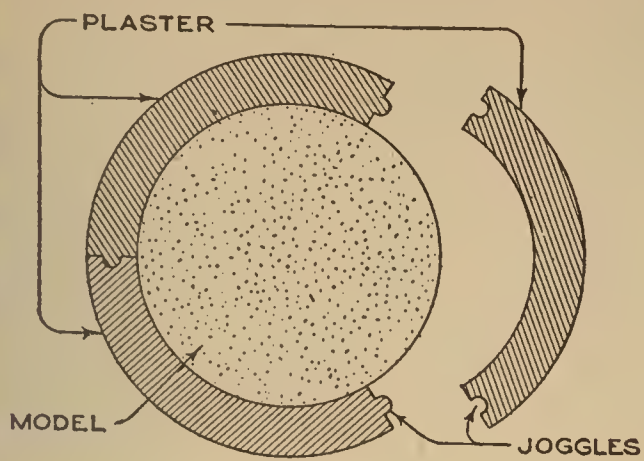


Fig. 15

CORRECT METHOD OF DIVIDING CIRCULAR MOLD

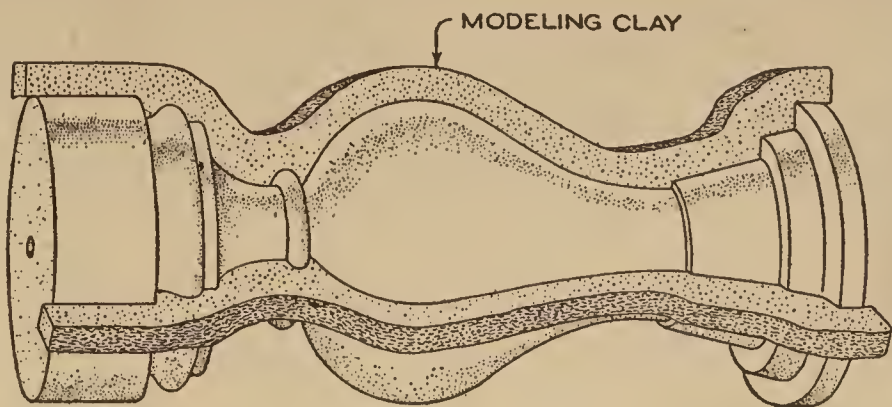


Fig. 16

BALUSTER LYING ON SIDE READY FOR APPLICATION OF PLASTER

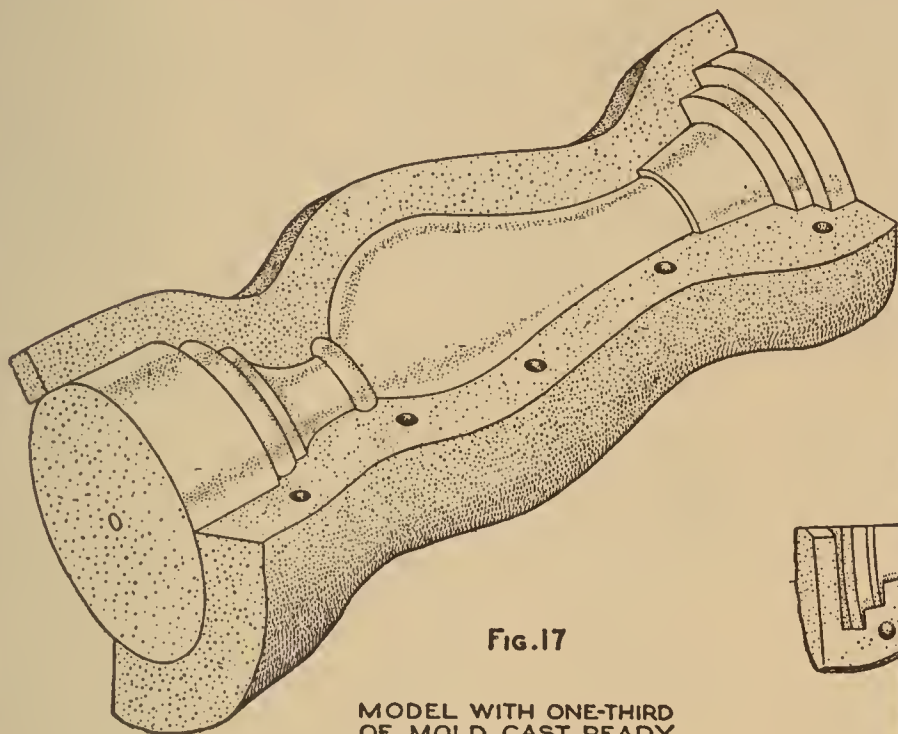


Fig. 17

MODEL WITH ONE-THIRD OF MOLD CAST, READY FOR POURING SECOND SECTION

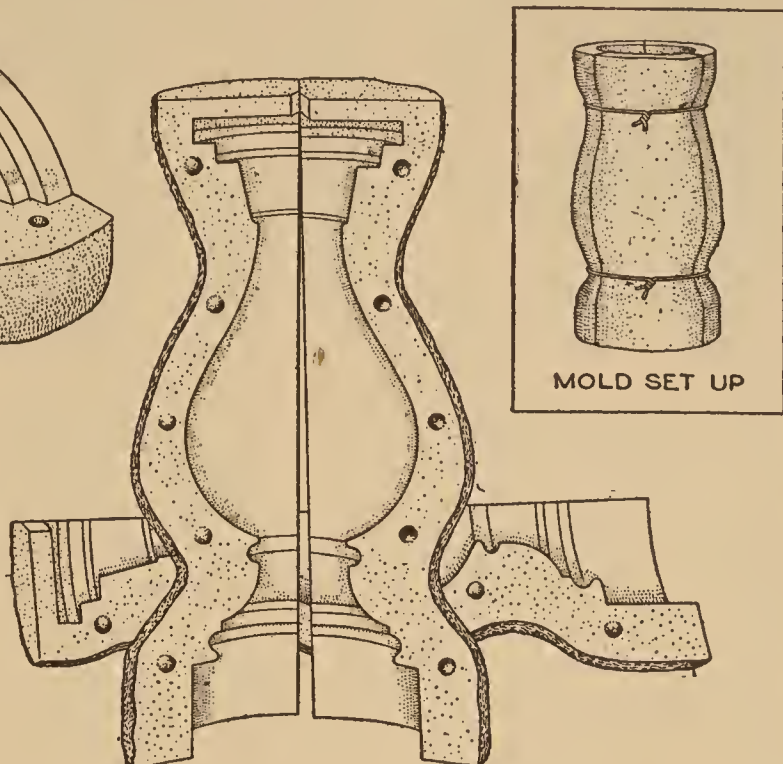


Fig. 18

MOLD COMPLETE

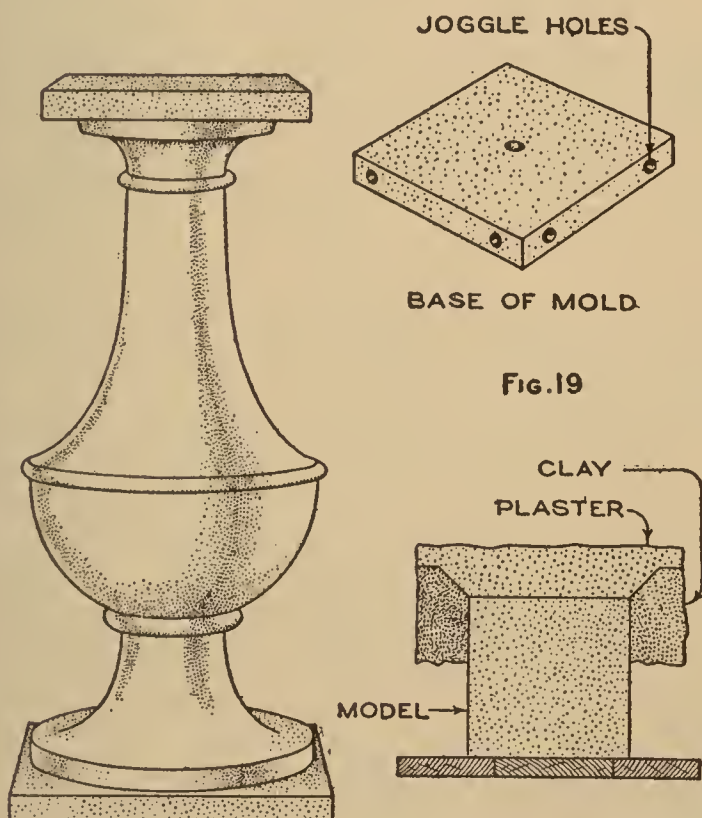
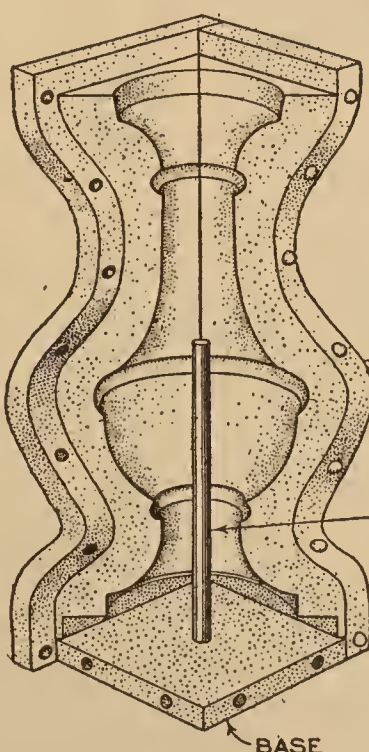


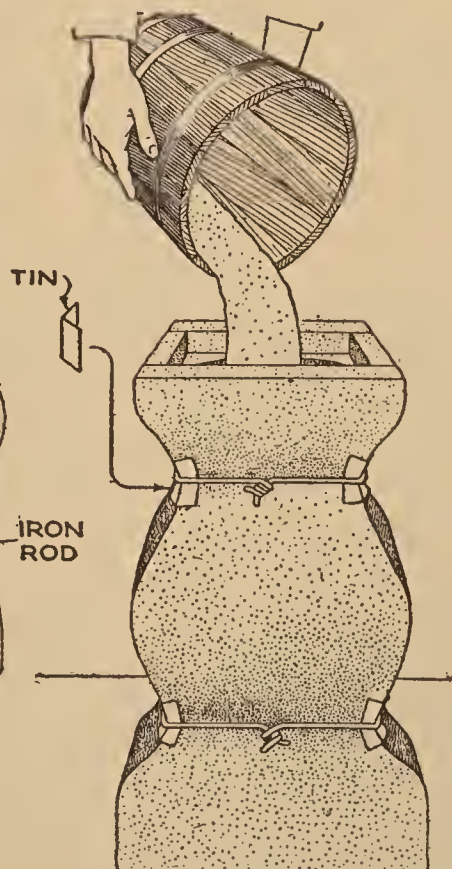
Fig. 19

METHOD OF MAKING MOLD



TWO SECTIONS OF MOLD AND BASE SET IN POSITION FOR FILLING

Fig. 21



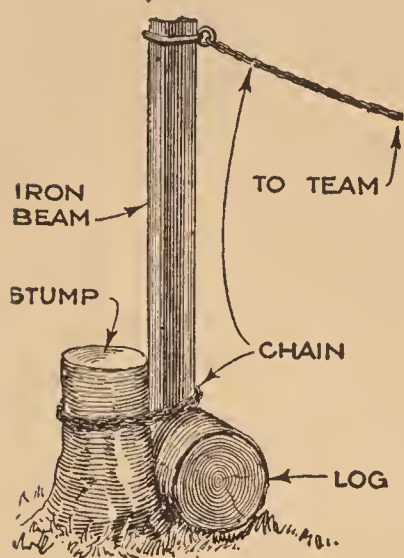
FILLING THE MOLD

Fig. 22

The Various Steps in Making Molds from Models of Circular Section are Shown in this Illustration. Figs. 15 to 18 Show the Construction of a Mold for Pieces Having a Circular Section Throughout; Figs. 19 to 21, Making a Mold for Pieces Having Square Sections Incorporated in the Design, As, in This Instance, the Cap and Base. A Method of Fastening the Molds When Filling with Concrete is Also Shown

A Simple Stump Puller

In upper Wisconsin, where thousands of acres of cut-over timberland are being cleared for agricultural purposes, an easily constructed but powerful stump puller is being largely used with good effect.



The device resembles a huge mallet, with a log for a head and an iron beam, or piece of steel, rail, for the handle, the purpose being to obtain increased leverage in pulling the stump. In use,

the puller is chained to the stump in the manner shown in the drawing, and a team of horses is hitched to a chain attached to the extremity of the handle. The pull gives a rolling movement to the head that has a tendency to lift the stump, while the power of the team, applied to the handle as a lever, is greatly increased. A stump puller of this type is a very effective substitute for the horsepower capstan-type puller, excepting in the case of very large stumps.—Leo P. Cook, Marinette, Wis.

Decorating Celluloid in Colors

Articles of celluloid can be decorated by using colored solutions of celluloid dissolved in glacial acetic acid or amyl acetate. If the article to be decorated is ivory-white, the celluloid used for the solution should be dissolved in amyl acetate, which is another name for the so-called "banana oil."

To prepare the article, three parts of paraffin and one part of white wax are melted at a low temperature, and either painted or flowed over the surface to be worked upon. The design is then transferred to the wax coating; this is done by making the design on tracing paper and transferring it to the wax by following the outline with the point of a pencil or stylus, leaving the design indented in the wax. After removing the transfer, the wax is scraped from the parts to be colored with a sharp-pointed instrument, broad spaces being freed of wax with a sharp penknife. If several colors or shades are to be used, only the lines for one color are cut and that color applied; these lines are then stopped out with wax

before the next color to be used is applied. To prepare the colors, small cuttings of colored celluloid are dissolved in either of the above-mentioned chemicals, using small wide-mouthed bottles. If colored celluloid is not obtainable, aniline dyes dissolved in alcohol can be added. The aniline dyes produce strong colors, while the solution made with the celluloid cuttings may not have as strong a color as desired, and more than one coat may be required to get the effect desired.

After the work has been completed, the wax can be easily removed from the article by rubbing with a soft rag and gasoline. The decoration obtained by this method is considered permanent, and, owing to the solvent action of the mixture, the applied work becomes practically a part of the article to which it is applied.—Bertha G. Morey, Ottumwa, Ia.

Manure Scraper from Planer Bit

The task of cleaning up the stable, or lot, after it has been occupied by cattle, is an undesirable but necessary chore.

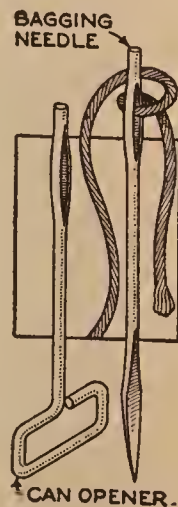
BLADE BOLTED TO BOARD

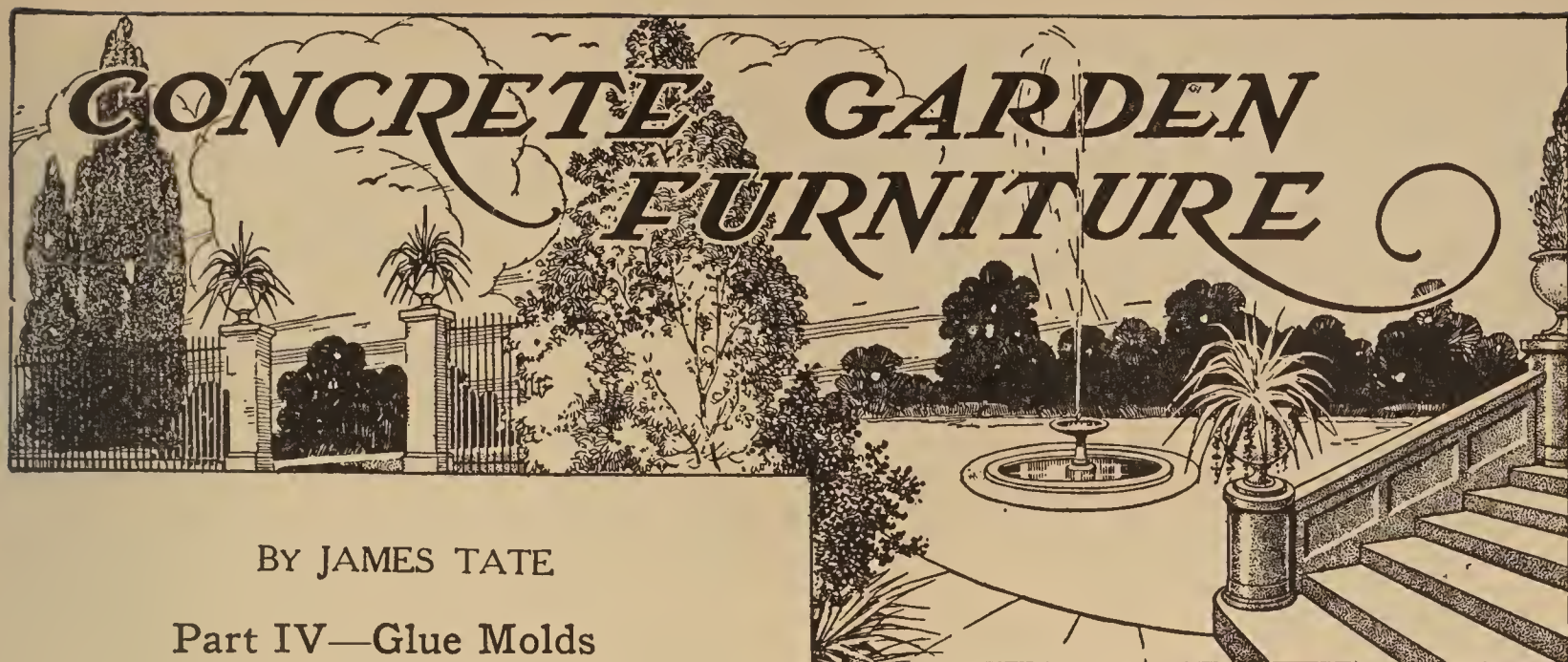


Hoes and shovels do the work rather slowly. The device shown in the drawing was made for the purpose, of a discarded planing-mill bit, bolted to a piece of heavy board, and provided with a handle. When put into use, the resulting saving in time and labor fully justified the time and expense entailed in making the device.—L. M. Jordan, Wallace, Ala.

Bagging Needle Made from Can Opener

A bagging, or netting, needle can easily be made from a discarded can opener, or key. The handle is straightened, and the end formed to a spear-shaped point, as illustrated. The opening in the opposite end may be expanded to suit the size of twine used, the resulting needle being fully as useful as the manufactured article. A needle of this type will be found very useful to the farmer, and as he usually has quite a large supply of canned goods on hand, the opener is generally available, while a regular bagging needle is not always at hand when required.—J. H. Norrell, Augusta, Ga.





BY JAMES TATE

Part IV—Glue Molds

WHEN pieces of elaborate design, containing portions more or less undercut, are to be cast in concrete, glue molds are employed.

To the worker who has followed this series thus far, the making of glue molds will present little difficulty. In this, as in the casting of balusters and pedestals, it is necessary that the worker procure a wooden model of the design to be reproduced, unless he has sufficient ability as a modeler to make his own designs in clay. For one who has not, there is a wealth of material available in old carved furniture, or in plaster ornaments, parts of which may be pressed into service; for example, the writer has often used old carved legs of tables as models for the legs of garden tables; pieces of plaster-ceiling ornament as decorations for panels on sundial and other pedestals, and ornamental plaster molding as models for molding to be used in connection with similar garden pieces; many other carved-furniture parts and ornaments may be used with equal facility. The last illustration in this installment shows a garden table made by using models of this character, and the making of the legs is illustrated in the other drawings.

The first step is to shellac and oil the model. Lay it down on the working board, as shown in Fig. 23, and draw a line along each side, in the most convenient position for parting.

Obtain two pieces of thin board, about 6 in. wide, and cut one edge of each piece to fit the model as closely as possible, at the parting line. Nail blocks on these boards, as in Fig. 24, to support them so that their upper face will be exactly at the parting line.

Take a sheet of old newspaper, wet it, and spread it over the upper half of the model, pressing it down into close contact. Then take some modeling clay, flatten it out into a sheet, about $\frac{1}{2}$ in. thick,

and apply it over the newspaper, pressing the clay down into every detail on the model surface, and carrying it down until it rests upon the boards at each side of the model. Oil the surface of the clay, then build up upon it a plaster case about 1 in. thick. Fig. 24 shows the clay and plaster coating, in section, upon the model. When the case has hardened, turn the model, with its clay and plaster covering, on its opposite side and remove the boards. This leaves one half of the model exposed, as in Fig. 25, with a straight, clean surface of clay and plaster at the parting line. Spread wet newspaper over the exposed half, apply



Fig. 23

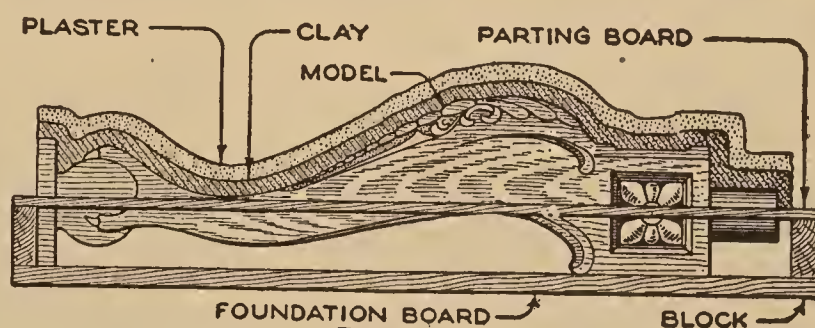


Fig. 24

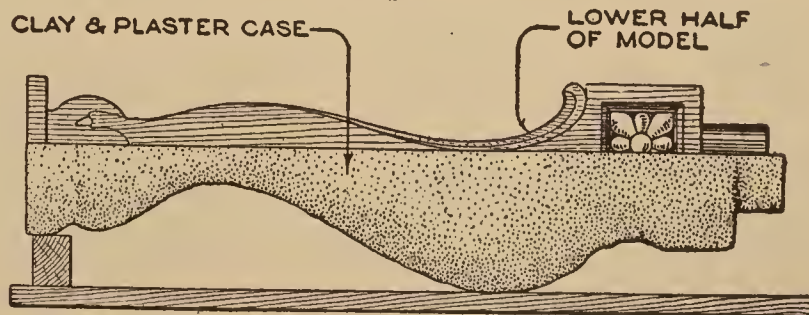
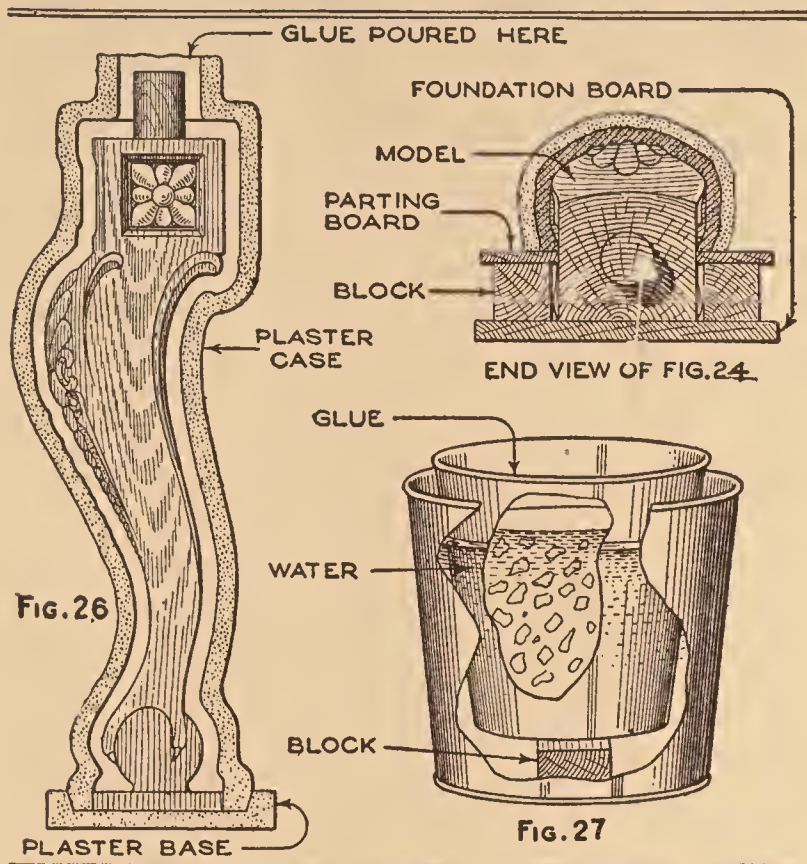


Fig. 25

Figs. 23-25—Method of Applying Clay and Plaster to the Model, and of Using Boards to Support the Case

the clay coat, oil, cut joggles in the edge of the plaster case, oil this edge, and pour the remainder of the case. Allow the whole assembly to harden thoroughly, then cast a plaster base on the case, as

shown in Fig. 26, tapering the bottom edges of the case before pouring the base. When hard, remove the base, separate the halves of the case, and carefully clean away the clay and the newspaper, both from the model and the case, shellac and oil all surfaces of the plaster case and base, oil the model, and reassemble. We have now the model inside the plaster case, with a space between, as may be seen by reference to Fig. 26, of the same



Mold in Position, Ready for Filling with Glue: Figure 27 Shows How the Glue should be Melted for Large Pieces

thickness as the clay had been. This space is to be filled with glue.

The glue used for molds is a good grade of white glue, obtainable at any dealer in painters' or plasterers' supplies. It must be melted in a regular gluepot, if the piece is small, or, if much glue is required, use two pails, one inside the other, as shown in Fig. 27. Support the inner one upon a block, a few inches high, fill the outer one about one-third full of water, put the glue, which has previously been soaked in water for about 15 minutes, into the inner one, with about a quart of water, then heat gently. When the glue is of the proper consistency, pour it into the space between case and model. The glue will require about 24 hours to harden. When hard, remove the plaster case, and cut the glue carefully along the slight ridge that marks the parting line of the case. This makes a glue mold in two parts. Paint the inside of the glue mold with the very best grade of clear varnish, three or four coats.

When ready to make a cast, place each

section of the glue mold back into its own half of the case; this is necessary because the glue is so flexible that it will not support either its own weight or the weight of the concrete. Oil the interior, assemble the case and base, strap the case firmly, and the mold is ready for filling with the mixture of 1 part Portland cement to 2 or 3 parts sand. Do not hesitate, when stripping the glue from either model or finished piece, to pull firmly, though carefully, on the glue mold over undercut portions; it will come away easily if proper care is taken, and will snap back into place when released. Glue molds cannot be used for more than four or five casts, but as the old mold, cut up into small pieces and allowed to dry, may be used again, there is little or no waste. The writer has seen molds made of glue that had been used for several hundred casts, and that, when used with a proportion of new glue, retained all its first flexibility, reproducing the most delicate designs with great fidelity.

The making and using of glue molds is a very interesting process, and is one that will repay the effort spent upon it. The worker should keep his eyes "peeled" for suitable subjects and models; many models may be picked up during the dismantling of old buildings; the passing of the saloon especially has made available many pieces of woodwork eminently suitable for this purpose. When reasonable care is used, pieces that will be a delight to the eye may be made from glue molds, and if simple designs are used, they will harmonize with almost any surroundings. Simple designs should, in any case, be chosen by the beginner, as, with elaborate

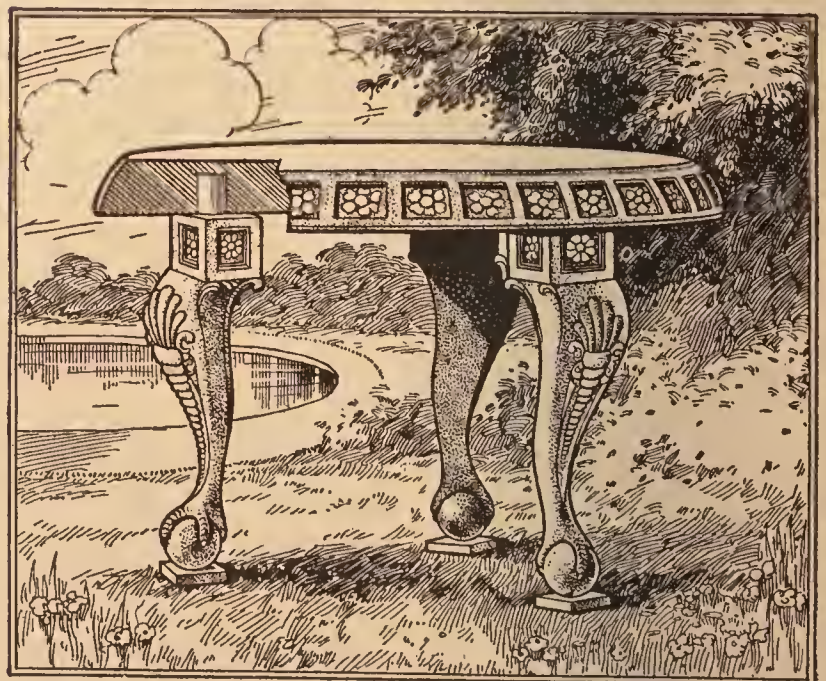


Table Cast in Concrete: The Legs were Cast in a Glue Mold Made by Using a Carved Table Leg as a Model

ones, the first results are apt to be somewhat disappointing.



Part V — Ornamental Pools

THE appearance of even the simplest garden may be considerably enhanced by the addition of an ornamental pool, of a size suitable to the surroundings. The construction of the garden pool is simple, and, with or without the presence of aquatic plants, a note of dignity and attractiveness is added to the garden by the cool, quiet water.

The selection of the site, while governed, of course, by the space available, and by consideration of the other details of the garden, is important, and should be given careful thought. The ground must be firm and well drained, to afford a good foundation for the walls and floor.

The weight of the water and concrete in a pool of fair size is considerable, and if the ground does not afford a solid support, there is some danger of settlement, with resulting cracking of the concrete. The quality and method of placing the concrete, the reinforcing, the forms used, and the method of surface finish are all important considerations, if the resulting walls are to be smooth, dense, and water-tight.

The foundations, as shown in the detailed illustration, should be carried down below the frost line, the drain pipe being led out underneath the footing. The forms should be made, for the rectangular pool, of 1-in. lumber, and, to insure a smooth, dense face on the wall, should be planed on both edges and face, carefully matched, and water-tight, as a small leak in the surface of the forms will allow the cement

to run through, thus leaving an air pocket in the surface of the wall.

Particular attention should be paid to the bracing of the forms; the best method is shown in the illustration. In addition to woven-wire reinforcing, shown by the dotted line in the cross-sectional view, $\frac{3}{8}$ -in. rods are used in the side walls; three on each side and end will be enough, spaced about 6 in. apart.

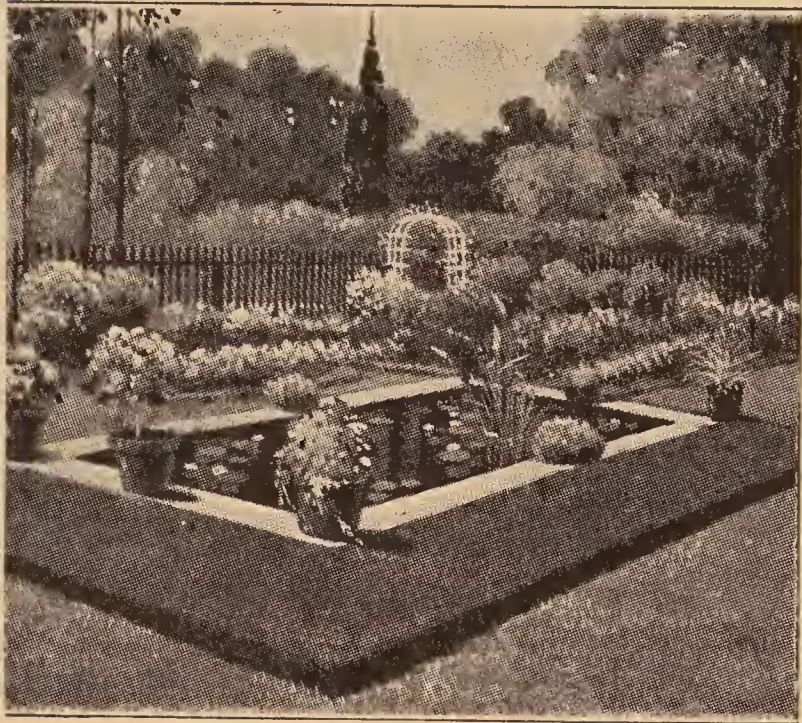
The concrete used is what is known as a 1.2:4 mix, that is, a mixture of 1 part Portland cement, 2 parts clean sharp sand, and 4 parts of clean broken stone. An estimate of the amount of material needed for a rectangular pool of the dimensions



Various Pieces of Concrete Garden Furniture Combined to Make a Most Attractive Ensemble: Note the Simple Semicircular Flower Bed

shown is: cement, $9\frac{1}{3}$ bbl.; sand, 2.8 cu. yd.; broken stone, 5.61 cu. yd.; woven wire, 65 sq. yd., and $\frac{3}{8}$ -in. rod, 140 ft. When the outside forms are in place, and the foundation laid, adjust the woven-wire reinforcing as shown by the dotted

line, place the inside forms in position, then fill in the concrete, which must be of a "mushy" consistency, spading it well next to the forms, and laying in the $\frac{3}{8}$ -in. rods in the proper positions. By spading is meant the thrusting of a thin paddle



A Pleasing Concrete Lily Pool of Suitable Size for the Small Garden

between the newly placed concrete and the form, to obtain a wall surface free from pits and voids. A hoe, straightened out in line with the handle, makes a good tool for this purpose, or a thin wooden paddle may be used. The inner forms may be removed in about 24 hours, and the face of the walls painted with a cement and water mixture, to make the surface more dense.

It should be noted that the inner form must be set to slope, as shown. This is necessary because, when winter sets in, and ice forms in the pool, the ice will slip up the sides, instead of exerting its thrust straight against the face of the walls, as it would if the faces were vertical.

The following materials will be necessary for the construction of a circular pool of the dimensions given: cement, $9\frac{1}{2}$ bbl.; sand, 3 cu. yd.; broken stone, 5.62 cu. yd.; woven wire, 75 sq. yd., and $\frac{3}{8}$ -in. rod, 110 ft. This pool may be constructed by using silo forms, if these are available; if they are not, sheet-metal forms will be found just as good. The method of reinforcing, placing the concrete, etc., is similar to that used in making the rectangular pool, but the inner face, to save trouble in making the form, should be left vertical, removing the inner form as soon as possible and forming the interior slope with cement.

The walls and bottoms of the pools

should be wetted at least twice a day for about two weeks, to assist in curing the concrete, and the pools should not be put into service until the end of this period.

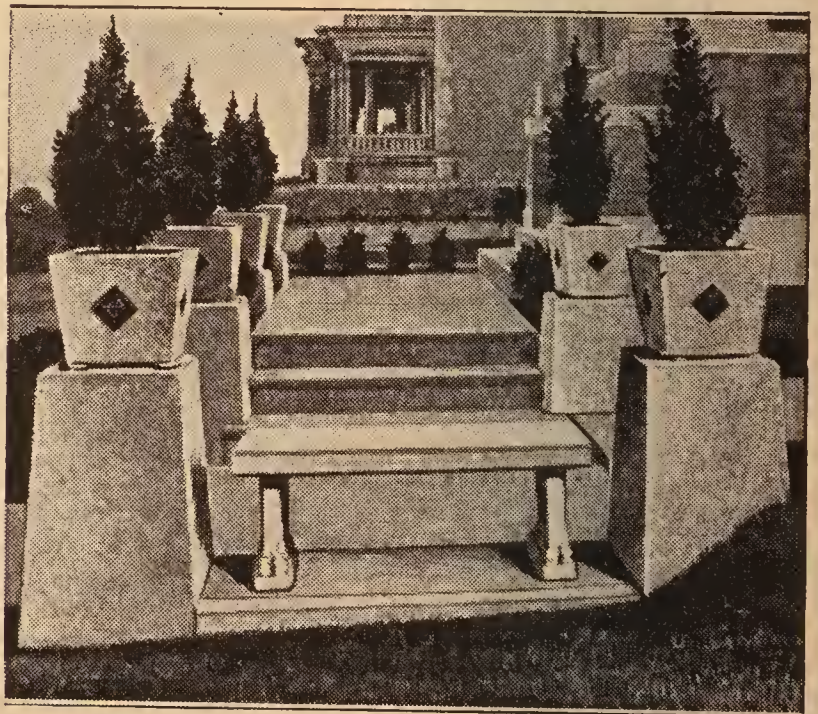
The best method of keeping the concrete wet is to cover all the exposed surfaces with canvas, wetted frequently. Another method of preventing the floor from drying too rapidly is to cover it with a layer of earth, 7 in. deep, sprinkling this thoroughly, together with the walls, several times a day.

At the end of the curing period, the floor should be covered with about 1 in. of water, this depth being gradually increased, until, at the end of about 20 days, the pool is filled with water.

It may not be amiss to give here a list of aquatic plants best suited for small pools. Among the *nymphæas*, or water lilies, the following varieties give best results: *N. Graziella*, *N. Aurora*, *N. fulva*, *N. pygmaea*, *N. pygmaea*, var. *helvola*. Parrot's feather, water snowflake, water poppy, and pickerel weed are also suitable, while papyrus forms a very attractive centerpiece around which to group smaller plants.

Many of the foregoing instructions apply with equal force to the construction of swimming pools, although somewhat greater care must be used in the selection of a suitable site, and in the reinforcing of the walls and floor.

As it is not possible to lay the floor of a large pool in a single day, joints must be provided at the end of a day's work. A $\frac{1}{2}$ -in. strip of wood, afterward removed, will form this joint. The open joint is



Simple Pedestals, Benches, and Flower Boxes Add Considerably to the Appearance of the Formal Garden

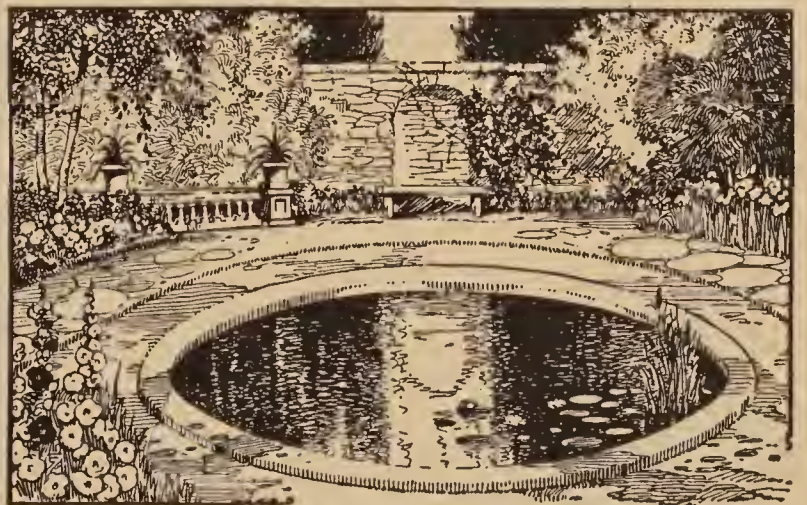
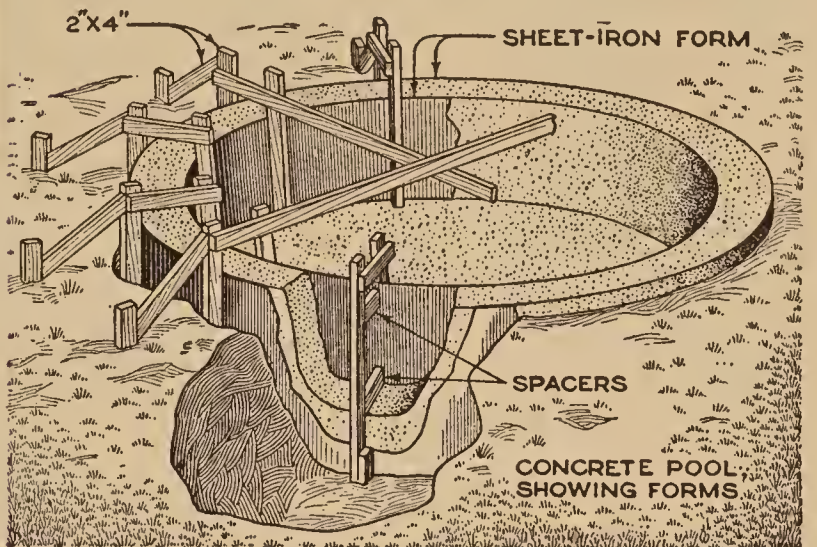
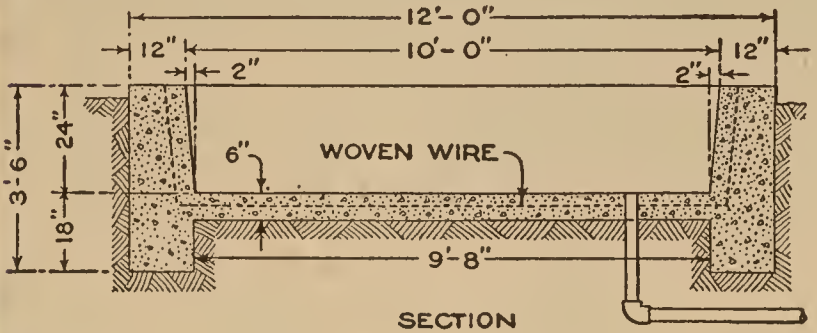
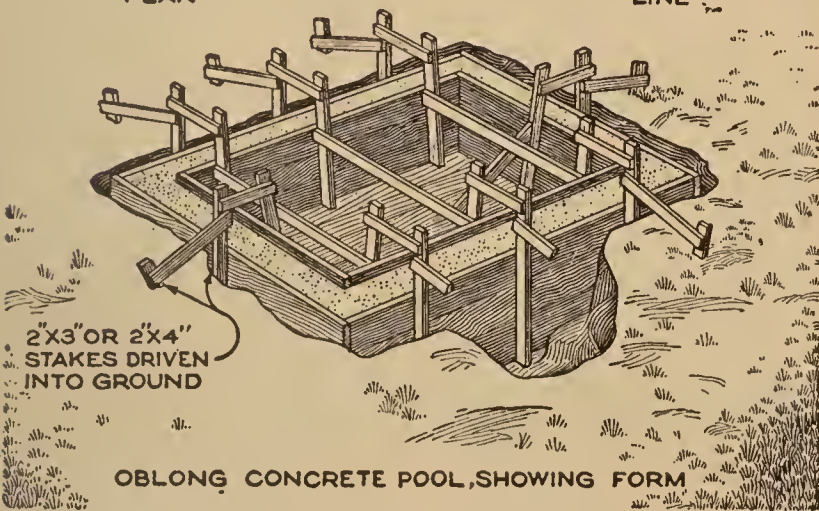
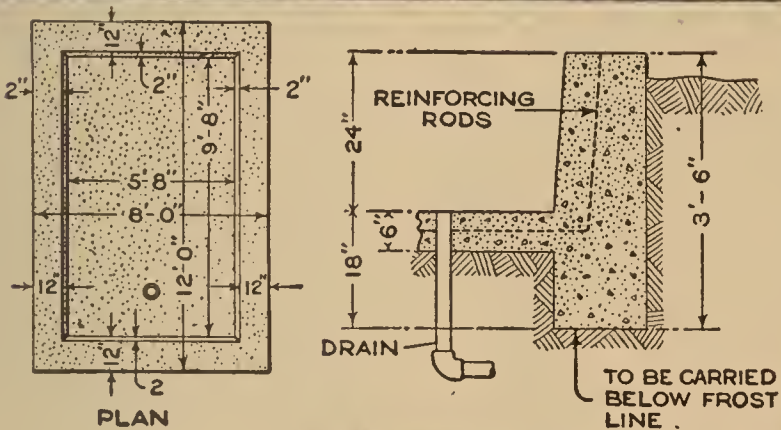
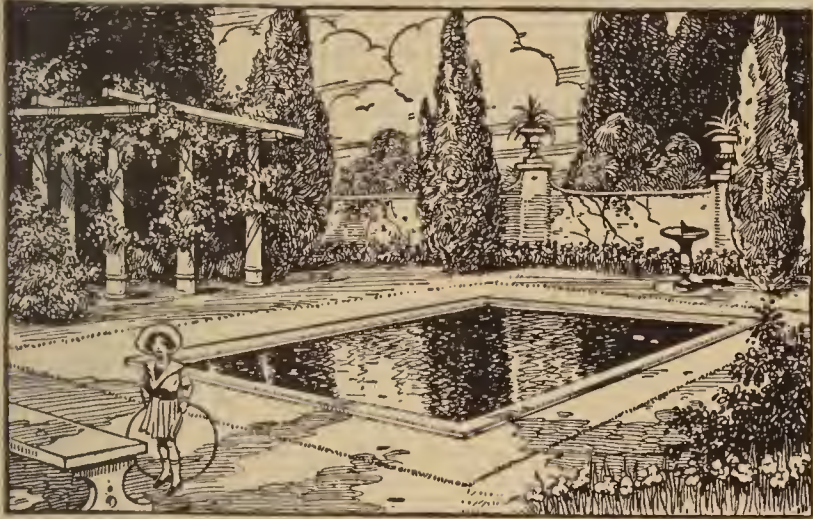
afterward filled with a bituminous sealing compound. A similar joint must be pro-

vided at the junction of wall and floor, and V-joints to provide a proper bond between previously laid material and the new concrete must be left in the walls.

The fittings for a swimming pool will, of course, depend upon personal preference. A springboard is almost a necessity, and steps or climb-out ladders, the latter preferably of U-shaped iron rods, with the ends imbedded in the walls, should be

and rough-finished with a wood float, to eliminate the danger of slipping. In these, as in all other pools, the underlying earth must be compact and firm, to support the concrete and prevent cracking.

The various types of garden furniture described in this series by no means exhaust the subject. The illustrations show what may be accomplished by grouping several pieces such as vases, pedestals,



Dimensions and Full Details of Two Easily Made Garden Pools: This Work Is of the Simplest Nature, and the Results will Be Very Pleasing If Proper Care is Used in the Selection of a Site. Aquatic Plants, Such as Water Lilies, Parrot's Feather, etc., may be Used in the Pools if Desired

provided for convenience of the bathers.

A concrete walk, rough-finished to prevent slipping, should run around the pool; this should not be laid until the backfill around the walls has settled for a period of several months; this will prevent the concrete walk from cracking.

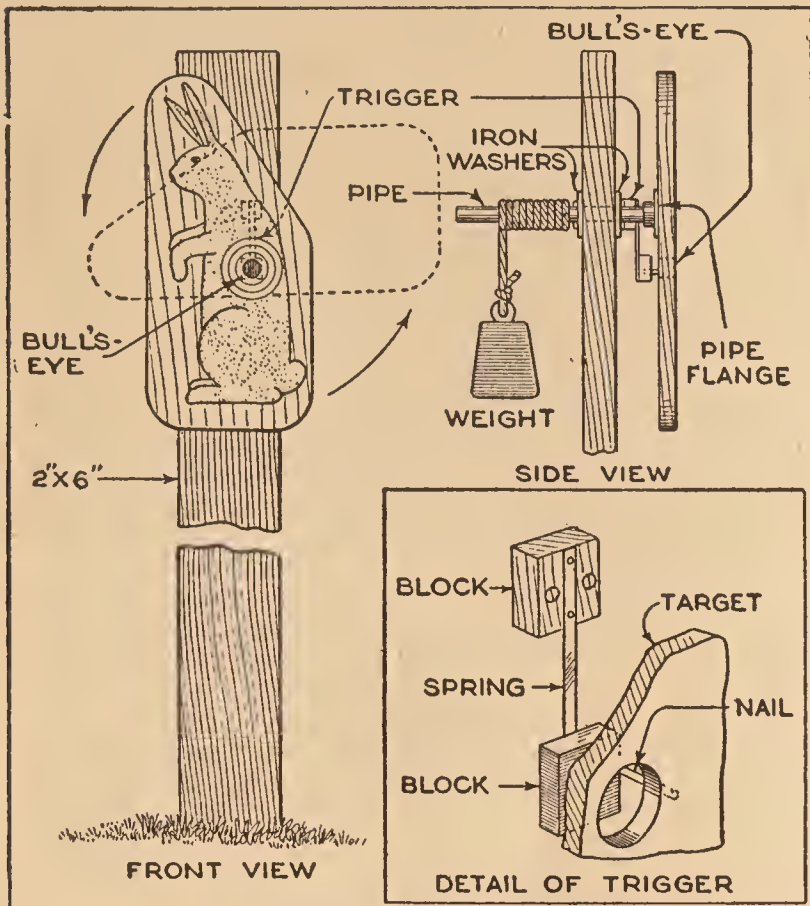
Wading pools are a godsend to the youngsters in hot weather, and will more than repay the effort of construction. They may be built with gradually sloping sides, dispensing with the wall and footing,

benches, etc. Small semicircular flower beds, set against, or made a part of, the wall, relieve the monotony of a long wall, and are very easily made; to the ingenious reader, many other combinations will suggest themselves.

In conclusion, I may say that the worker will find the making of garden furniture in concrete a very interesting pursuit, and the articles produced are a permanent addition to the attractiveness of the home site.

The Somersaulting "Bunny" Target

The somersaulting "bunny" target shown in the drawing is intended for target practice with the bow and arrow,



Whenever the Marksman Makes a Bull's-Eye on This Target the "Bunny" Makes a Complete Somersault, and Turns Again to an Upright Position Ready for Another Shot

but, by substituting sheet-iron parts for the wooden ones described, it may be used as well for small-caliber rifle practice.

The rabbit is outlined on a 10 by 24-in. board with the rings and bull's-eye of the target a trifle off center to the right; the bull's-eye is formed by drilling a 1½-in. hole through the board.

A 2 by 6-in. post is used for supporting the target, which is mounted on a shaft so as to revolve freely. A piece of gas pipe, about 12 in. long, will answer for the shaft; this is inserted through a hole drilled in the post, and is attached to the back of the target with a floor flange. A washer on each side of the post, together with cotter pins driven through holes in the shaft, serve to maintain the proper space between the post and target for the operation of the trigger.

The trigger is made by fastening two blocks of wood to the opposite ends and sides of a piece of spring steel. One of the blocks is nailed to the post, in such a position as to bring the other block directly behind the bull's-eye block, and, by bearing against a nail in the back of the target, to hold the rabbit vertically until the trigger is released by a properly placed shot.

The somersaulting effect is produced

by the weight arrangement shown in the drawing. A piece of stout twine is wound around the projecting end of the shaft, behind the post, and a weight is attached to the free end. The target remains stationary until a lucky shot springs the trigger; the weight then unwinds the rope, and the rabbit makes a complete revolution, the nail striking the block again and stopping the target when it is in an upright position.

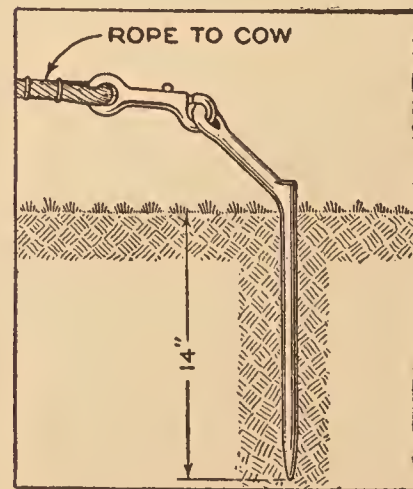
From 10 to 20 bull's-eyes may be recorded by the somersaulting bunny, according to the number of turns of rope around the shaft, before it is necessary to rewind it.—G. E. Hendrickson, Argyle, Wisconsin.

Filling a Blown-Out Tire with Water

A motorist, having experienced a blow-out on the road far from any garage or repair shop, found that he was without the necessary repair materials which every car owner should carry. In this emergency the idea of filling the tire with water occurred to him, and, as the water did not leak out as rapidly as the air, the trip to the nearest garage was made without running on the rim or damaging the tire. The water was injected into the tire with the pump.—L. E. Brundage, Norwood, Colo.

A Revolving Tether Stake

Owners of live stock know the disadvantages of tethering their animals to a simple stake driven into the ground. One of two things generally happens: the animal winds the rope around the stake or else, pulling the stake, strays.



The revolving tether stake shown in the drawing is forged from a 22-in. piece of 1-in. round iron rod. The vertical portion of the stake is 14 in. long, and the bend, which is made at an angle of about 45°, takes up the additional length. An eye is formed in the upper end of the stake, and a shoulder is forged on the outside of the angle, as indicated, to aid in driving the stake into the earth. As the animal grazes, the stake will turn but will not pull out.—G. A. Tibbans, Galena, Kan.

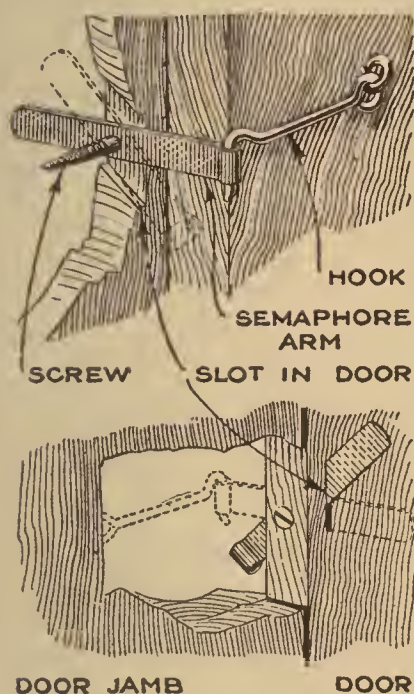
Avoiding Dry Rot under Linoleum

When linoleum is fitted closely to the baseboard of a room, it often contributes to dry rot in the floor, as it prevents proper circulation.

It is better to leave a margin of a few inches around the linoleum, but, if this cannot be done, and the covering is fitted closely, it should be taken up occasionally to allow the floor surface to be aired.

Semaphore Lock for Locker Doors

The bathhouse of an Ohio summer resort has its locker doors equipped with a simple device that indicates at a glance



just what lockers are in use. Instead of the usual knobs and locks, an arm of stiff sheet iron, about 2 by 7 in., is thrust through a slot cut in the door about 1 in. from the edge. The arm is pivoted near its center by a long screw that passes through it from the edge of the door. An eye is formed on the inside end of the arm in which a

common screen-door hook catches. When the door is thus hooked, the outer end of the arm extends horizontally, indicating that the locker is occupied; when the door is unlatched from within, the inner end of the arm, being heavier, falls and pulls the outer end upward, showing that the locker is unoccupied.—Curtis Ralston, Springfield, Ohio.

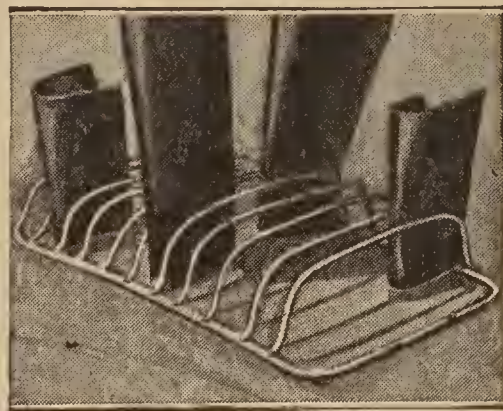
Picric-Acid Solution for Burns

A solution of picric acid, made by dissolving 30 gr., or $\frac{1}{2}$ dr., of picric acid in 1 pt. of water, is a very effective remedy for burns. This solution relieves the pain very quickly, and by its antiseptic action promotes rapid healing. The picric-acid solution also leaves a persistent yellow stain, but the patient is usually less concerned with this than with the alleviation of his suffering.

However, while this solution is perfectly safe when used on burns of limited area, it is likely to cause poisoning by absorption, when applied to a large surface that has been denuded of skin.

Rack for Developing Cut Films

Amateur photographers using cut films can save some of the time and bother involved in developing each film individually by an adaptation of the tank system for treating all the films at one time.



The drawing shows how a simple soap dish can be used as a

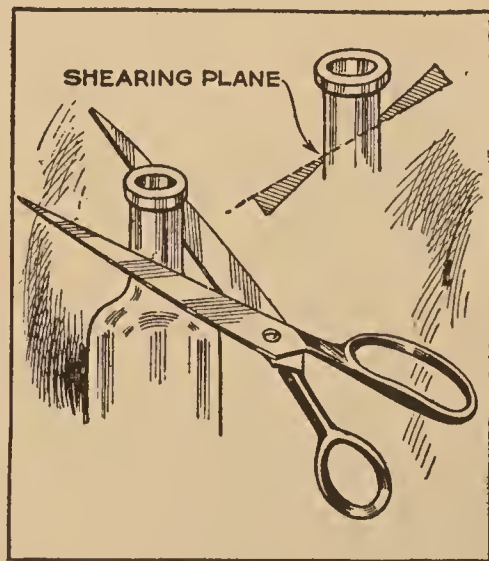
rack to hold the films in the solution. Roll films can also be held in the same manner by folding them in a "wave" formation, with loops, about 2 in. long, inserted on each side of the wires.

The tank can be made from any earthenware vessel large enough to hold the rack and films. Care should be taken, of course, to prevent parts of the films from coming into contact with each other, as this would cause spots. The films can be removed from the developer, rinsed off in clear water, and placed in the fixing and washing baths without removal from the holder.—R. U. Clark III, Newton, Mass.

Sharpening Scissors on a Bottle

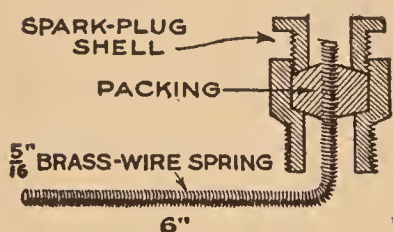
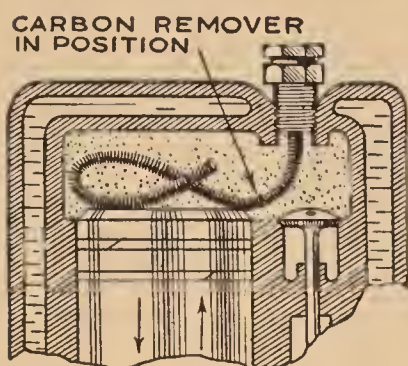
One reason why scissors fail to cut is that the edges, which should come together and cut the material in passing each other, are somewhat rounded and merely pinch the material between them instead of cutting it.

To turn up the edges somewhat and restore the sharpness to a pair of scissors, place the neck of a small bottle between the blades, as though about to cut it. Hold the scissors at an angle, so that the edges of the cutting blades are turned inward; open and close the scissors several times, and allow the cutting edges to slide back and forth on the glass surface. This operation turns over a new sharp edge on both blades, and causes them to meet more closely.



Spiral Spring Removes Carbon

Brass wire of small size, closely wound into a spring the diameter of a pencil and



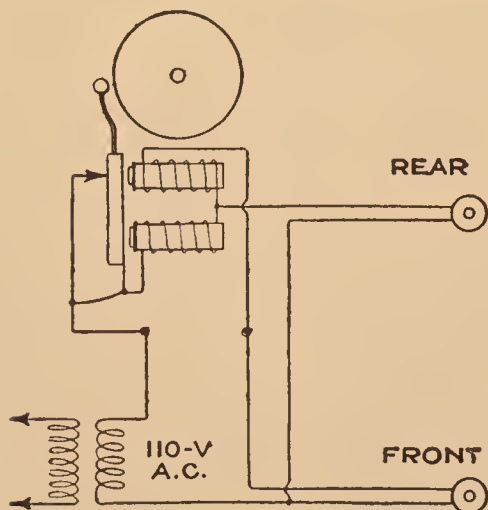
attached to the shell of an old spark plug, as indicated in the drawing, makes a serviceable and inexpensive tool for beating carbon accumulations loose from the cylinders and pistons of an automobile engine.

The spring extends about 6 in. inside the cylinder, and is rapidly driven about by the moving piston

while the engine is being run on the other cylinders. Brass wire only should be used for the spring, as it will not score the cylinder walls, and the spring should be sufficiently flexible to drop with and follow the piston in its movements. Particles of carbon being discharged through the exhaust may be accepted as evidence that the spring is doing its work properly. In the case of very oily carbon, a little kerosene poured into the top of the cleaner plug, so that it will flow down through the spring, will assist materially.

Bell Gives Two Distinct Signals

In the installation of doorbells it is customary to use both a bell and a buzzer, in order to distinguish between signals from the front and rear doors. By the arrangement described, the buzzer is eliminated, and the bell circuit so modified that one bell will give



two distinct signals, a ring when the button at the front door is pushed, and a buzz when the button at the back door is operated.

A tap is taken from the bell winding

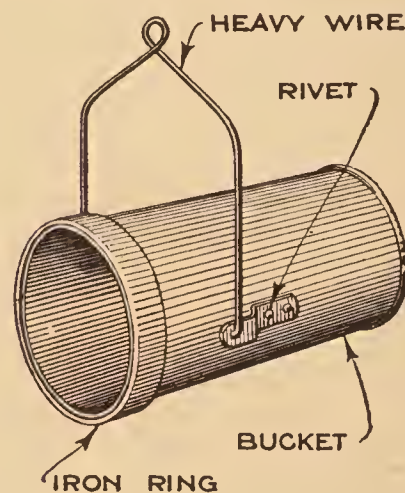
the cover of the bell, and the circuit is wired as in the drawing. The clapper is adjusted so that the hammer is $\frac{3}{32}$ in. from the bell when the armature is at rest.

Current flows through only one coil of the bell when the button at the back door is pressed. While the magnetic energy of this single core will be sufficient to operate the armature, the clapper is not brought up forcibly enough to have the $\frac{3}{32}$ -in. overthrow necessary to strike the bell. Consequently, instead of ringing, the bell simply buzzes. If, however, the button at the front door is pushed, both of the bell coils receive current in the usual manner and the magnetic effect of the cores is, in this case, sufficient to cause the armature to operate with such force that the clapper strikes the bell.

If batteries are used in place of a transformer, the circuit is the same as shown, with the exception that the interrupter contacts are not short-circuited.—H. H. Schneckloth, Omaha, Neb.

A Weighted Well Bucket

Everyone who has had occasion to draw water from a well after "the old oaken



bucket" fashion knows how provoking it is to drop the bucket into the well and have to shake it around in order to make it overturn and fill with water.

This difficulty can be overcome by riveting an iron ring to the top of the bucket, thus making it top-heavy

when empty, and placing strap-iron ears so arranged that the bucket, when empty, will swing to the position shown in the drawing. When filled, the additional weight of the water below the ears will keep the bucket upright.—W. W. Parker, Lead City, S. D.

Softening Hard Putty

Putty that has become hardened by exposure, as around window glass, may be softened and removed by the use of the following mixture: Shake 3 lb. quicklime in water and add 1 lb. pearlash, making the whole about the consistency of paint. Apply to the putty on both sides of the glass and let it remain for about 12 hours. The glass can then be lifted out without trouble.

Tested Radio Grounds

By F. L. BRITTIN

A GOOD ground system makes great things possible for the radio enthusiast. The grounds of the government and commercial stations are very complex and cover large areas. The average amateur does not give enough attention to his ground system; this is a mistake, as no matter how good the apparatus may be, its efficiency is no greater than that of its weakest point.

Soldered joints and a fairly heavy ground lead, preferably of the seven-strand, rubber-insulated type, should be used, and in choosing the best method for grounding the station, the fact that the wave length is governed by the length of the ground lead as well as by the length of the aerial must be taken into consideration. The total length of the aerial is always measured from the far end of the aerial to the ground; after reaching the ground, the main thing is to get a good "hold" on it.

Many methods are in use, but those shown in the drawing give the best results. Figure 1 shows the most common method, consisting of a 7 or 8-ft. iron rod driven into the earth with the lead to the aerial switch securely soldered to it. A hole should be drilled through the upper end at the point of connection so that the wire may be threaded through it before soldering, thus insuring a tight joint. The method shown in Fig. 2 is another much used system, and consists in grounding to a water pipe by means of a clamp. The pipe should be scraped free of all paint before the clamp is applied. The water ground illustrated by Fig. 3 is very efficient, although not a common one, as the water is not usually at hand; a near-by well or cistern can be used by soldering a metal plate, preferably copper, to the end of the lead, and dropping the plate into the water.

The buried-plate ground is shown in Fig. 4, and consists of a number of copper plates buried in the ground, the leads being connected at a common point. One of the best systems in use is the buried-counterpoise type, shown in Fig. 5. A number of trenches, about 10 or 15 in.

deep, are dug, radiating in all directions under the aerial, and No. 12 bare copper wire is buried in them and brought together to a common point, whence the lead is taken to the aerial or so-called lightning switch. Twice as much wire is buried as there is in the aerial; this makes the best ground known, especially when used in connection with the water ground in Fig. 3. A type of ground that has been used with excellent results is shown in Fig. 6 and consists of a coil of 2-in. pipe, filled with water, and buried 5 ft. under ground. A suspended counterpoise is illustrated in Fig. 7; this consists of a second aerial suspended directly underneath the aerial proper and connected to the instruments in the manner indicated. The results from this method are good when the counterpoise is suspended about 15 ft. above the ground.

Whenever the ground or aerial is changed or altered, the operator should use his wave meter to be sure that he is keeping within the 200-meter limit, and should retune his transmitter.

Apropos of the 200-meter wave limit, all amateur stations should make an effort to get down to this wave length. Nothing will hurt the amateur radio enthusiasts all over the country so much as disobeying government regulations. The ama-

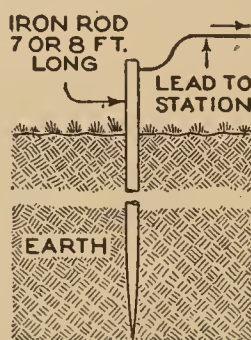


Fig. 1

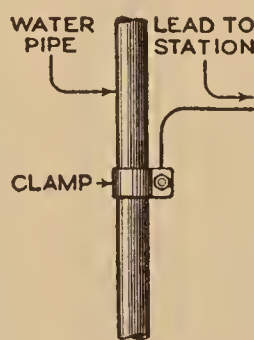


Fig. 2

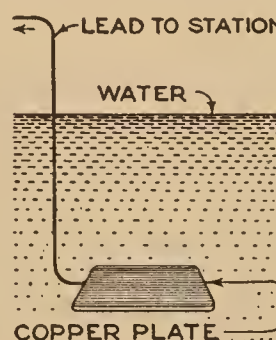


Fig. 3

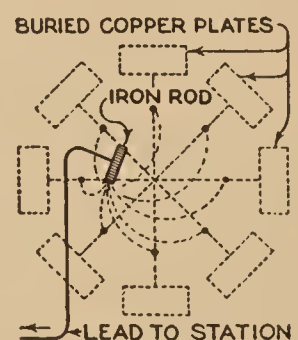


Fig. 4



Fig. 5



Fig. 6

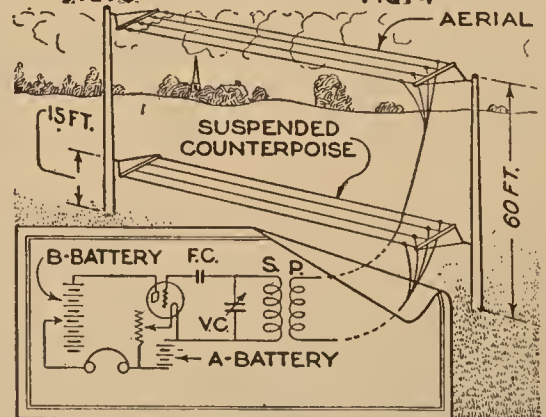


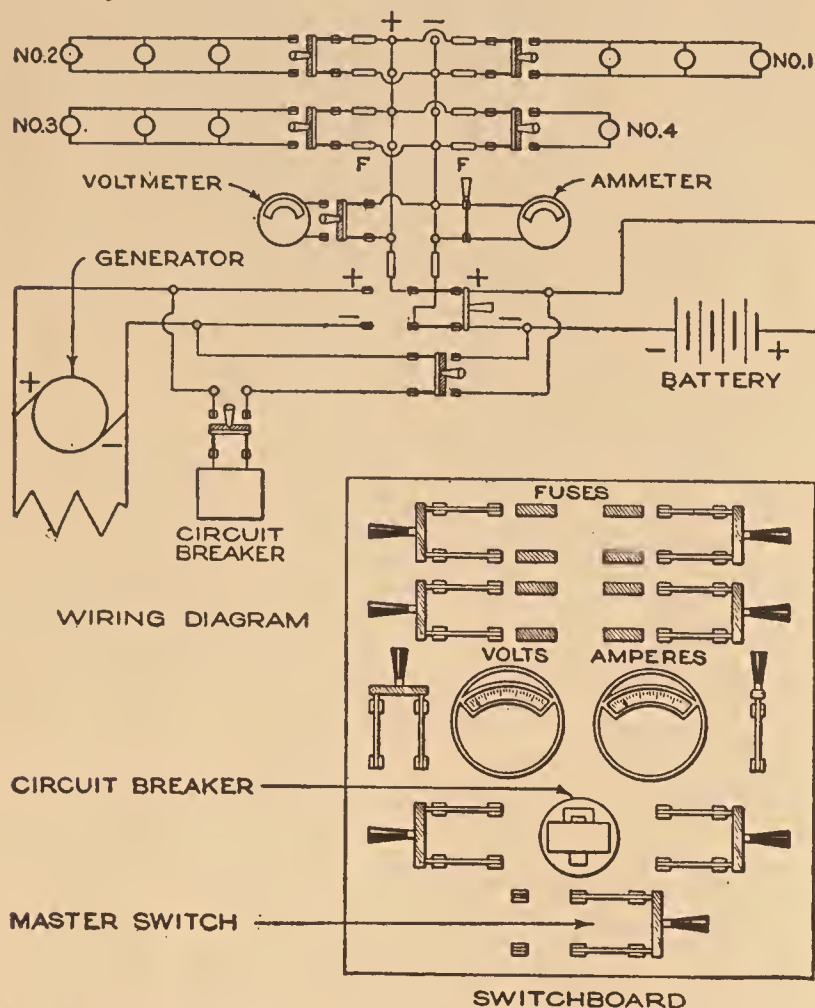
Fig. 7

A Number of Different Methods of Grounding Amateur Wireless Stations, by Means of Which the Efficiency of the Average Apparatus may be Materially Increased

teur generally seems to be under the impression that his infraction of this rule passes unnoticed; this is not so, and, if present regulations are not adhered to, the result will be that stricter laws will be passed and enforced.

Motorboat Illumination

Because electricity lacks the dangerous and disagreeable characteristics of oil, it is only natural that its use on motor craft



A Neat Arrangement for the Electric-Lighting System of a Motorboat or Cruiser: An Automobile Generator may be Used to Furnish All the Current Required, While a Storage Battery Takes Care of Emergency Demands

of various styles is becoming more and more common.

The electrical system shown can be easily installed, and advantage is taken of the efficiency of tungsten lamps operated from a six-volt current. Also, on account of the low voltage, No. 14 gauge rubber-insulated wire can be used without the trouble and expense of putting it in metallic conduit.

A generator having an output of from 6 to 8 volts, and an amperage of from

6 to 10, is needed to furnish the charging current. This is about the capacity of the average automobile generator, and as these can be picked up cheaply from wreckers and secondhand dealers, the cost will not be great. Such generators are usually designed to be driven by a silent chain, and this arrangement should preferably be adhered to, as the drive is more positive than a belt drive. The storage battery for emergency purposes can be concealed in some accessible locker from which the corrosive acid fumes can be carried away by ventilation.

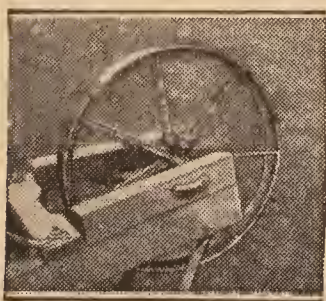
The drawing shows the appearance of the small switchboard and its wiring arrangement for use with such a system; it is divided into four circuits, with a volt and ammeter, a main switch, and a small circuit breaker. It might be mentioned that the knife switches shown can be replaced by the smaller and neater snap switches. Circuit No. 1 takes care of the three running lights, port, starboard, and mast; circuit No. 2 is connected to the toilet, galley, binnacle, or an engine-trouble lamp as desirable, while circuit No. 3 controls the cabin lights, and circuit No. 4 takes care of the searchlight. Naturally, the circuits and their arrangement are merely suggestive, but represent typical practice.

All the running lights should be controlled directly from the switchboard, but the others may be placed in key sockets.

During charging, it will be seen that both volt and ammeters can be used, provided all the lighting circuits are open. The circuit breaker should be set for the correct charging current, and will take care of this automatically. However, the circuit breaker can be dispensed with by frequently observing the fluctuations of the voltmeter. Fuses in each circuit are inserted to prevent the battery from injury through a short circuit.

Silencing a Wheelbarrow

The park commissioner of a western town believes that there are more agreeable sounds than the distressing and nerve-shattering screech and squeak of a rusty wheelbarrow. Accordingly, all the wheelbarrows used by his department were fitted with grease cups as



shown. A hole was drilled and tapped through the hub of the wheel to take

the grease cup. Not only was all the undesirable noise eliminated, but as the friction of the wheel on its unlubricated shaft was materially reduced, it was much easier to push the loaded barrows.

Making Contrasty Prints from Flat Negatives

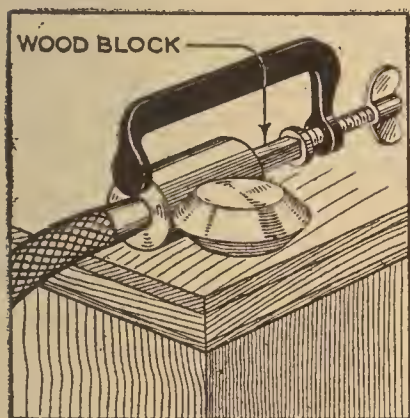
Very frequently negatives are underexposed, and yield, with printing paper of "medium" contrast, a very dull and lifeless print. If the "hard" or contrast grades of paper are not at hand, bright prints can still be obtained from almost

any negative of this character by varying the duration of development.

Expose the print for about one-fifth the ordinary time, and then place it in developer that is about one-fifth the normal strength. The image will develop very slowly, but if left in the developer for the proper time, which is somewhat longer than normally required, a bright print will be the result.

Removing Corroded Cable Terminals

Pounding with a hammer, or forcibly jerking the cable to loosen a corroded storage-battery connection is quite likely



to result in broken battery plates or cell jars, while using a spike or bolt to drive out the terminal usually damages the terminal threads so that trouble will be experienced in getting the terminal nut to screw

in properly. All injury to the battery and terminal will be prevented by the use of an ordinary screw clamp and a short wooden plug applied to the connection. The plug bears against the end of the terminal, and as pressure is applied by turning the screw, the cable is forced out.

A Bedtime Savings Bank

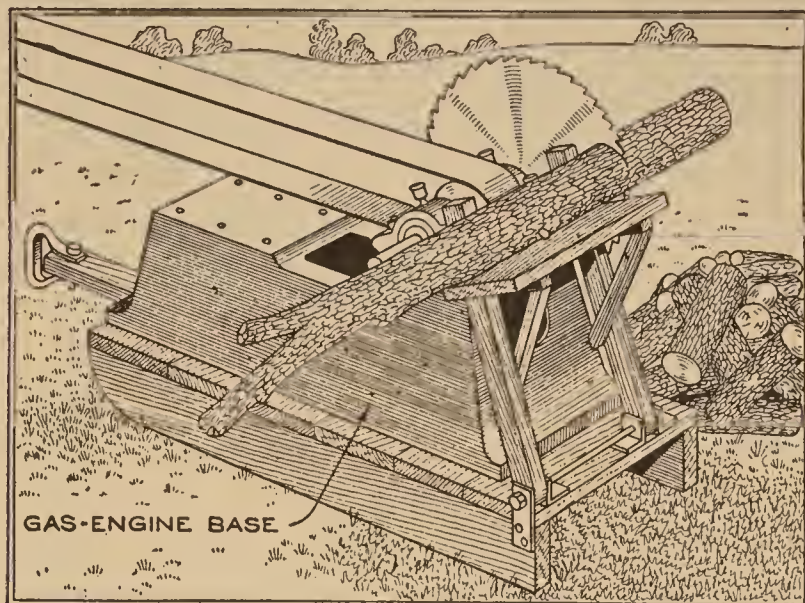
The drawing shows an interesting and original method of "banking" small change, that is proof against the attacks to which earthenware pigs and similar "banks" are subject.

Immediately below one of the ornamental caps of a tubular bedstead a slot is cut out with a hacksaw just large enough to receive the largest coin likely to be inserted. An examination of the bed should first be made to determine whether the casters can be removed to permit "withdrawals."—Norman Hazen, Montreal, Que.



Saw Frame from an Old Engine Base

The cast-iron base of an old gasoline engine can be converted into a most substantial frame for a pole or cordwood saw,



The Base of a Discarded Gasoline Engine Mounted on a Wooden Sled may be Used to Make a Most Substantial Frame for a Circular Saw for Cutting Up Poles and Cordwood

and but very little work is required to convert it to its new purpose. Such old engines can usually be picked up at implement stores and scrap yards at junk prices. The base is stripped clean of everything—cylinder, crankshaft, and the like—and mounted on a pair of 3-in. plank runners, with a short tongue attached to the rear end for moving it from place to place.

A piece of steel shafting is obtained, and one end of it is threaded to take a nut holding the saw. Two collars, several inches in diameter, are also provided for this, the inner one threaded to fit the shaft, the outer one a loose fit on it; also, a suitable pulley is attached. If the saw mandrel thus made is smaller than the engine bearings, the old babbitt is removed and the bearings are rebabbitted to fit the mandrel.

The logs are held to the saw on a swinging table attached to the sled, as shown in the drawing.

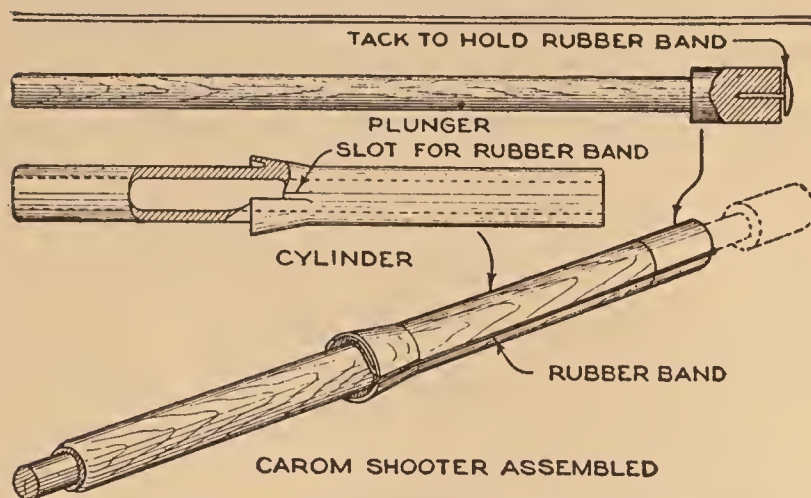
The cast-iron frame will not twist and bind the saw mandrel, and has sufficient weight to hold it to the ground with little or no staking to hold it against the tension of the belt.—G. G. McVicker, North Bend, Neb.

A Simple Carom Cue

Shooting the pieces with the fingers, as in such games as carom and crokinole, is sometimes quite painful, and at no time can the player direct his shot to the best advantage.

To overcome these objections, the cue

shown in the drawing was developed. It can be easily made from two pieces of round wood, the larger being bored to fit



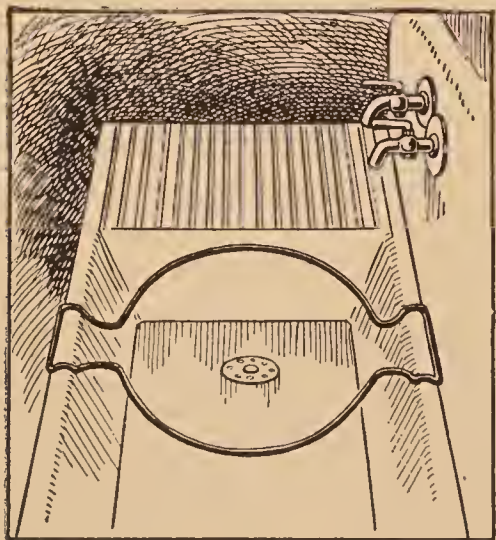
An Easily Made Cue for Playing Carom and Crokinole That Makes More Accurate Shots Possible and Relieves the Fingers: The Plunger is Operated by Rubber Bands

the smaller piece, which acts as a plunger. A shoulder is cut on one end of the plunger to limit its travel, and a tapered, undercut shoulder, having slots cut on opposite sides to hold the rubber bands, is formed on the cylinder. Two rubber bands are used, which extend from the shoulder on the cylinder to the end of the plunger, where they are secured underneath a tack, as shown.

In use, the cylinder is held in the left hand and the plunger is pulled back with the right. When the cue has been properly lined up with the piece to be shot, the plunger is released. "Hard" or "soft" shots can be made with this cue, depending altogether upon the distance that the plunger is pulled back.—Lester A. Hitchcock, Kewanee, Ill.

Overcoming Disadvantages of a Narrow Sink

Many people experience the annoyance of having to use standard-size kitchen utensils in the miniature sinks that some



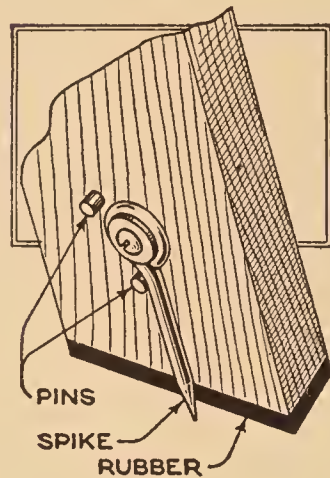
builders insist upon installing in present-day apartments and houses. In many cases the sink is so small that the housewife has difficulty in getting a regulation-size dishpan or washbasin to fit into it. This condition can be overcome by taking a piece of heavy wire, or light iron rod, and

bending to the shape indicated in the drawing, making the diameter suited to that of the basin. This frame can be placed to rest on the edges of the sink when wanted, and hung underneath when out of service. It is also of advantage when the sink, although perhaps wide enough, has been set too low, as the pans or basins will be raised to such a height that dishwashing will no longer be a back-breaking task.—Lloyd R. Dickens, Stratford, Ont.

Safety Attachment for a Ladder

Bad falls are sometimes the result of a slipping stepladder, and as it is always better to be safe than sorry, the ladder should be safeguarded against slipping.

The drawing shows how the ladder may



be made safe by gluing a piece of old automobile inner tube to the bottom of each leg; this will effectively prevent any tendency to slip when the ladder is used on smooth, polished floors that must not be marred.

The spike is used on rough floors, concrete, etc., where the slight mark made by it will not be objectionable. When in use, the spike, which is pivoted on a screw, bears against the lower pin and prevents the ladder from slipping. When the use of the spike is undesirable or unnecessary, it is swung back on its pivot and rests on the upper pin.—Lowell R. Butcher, Colfax, Ia.

Airplane Motors from Auto Tubes

The enthusiasm of the model-airplane builder is usually brought up with a jolt when he comes to the rubber-band motor required to propel his plane and finds that the rubber bands cannot be bought in his locality.

In such cases, old automobile inner tubes fill the bill and at very little, if any, cost. Using a pair of sharp scissors, cut strips from the length of each tube and tie them together. If a single strip is required, cut around the tube in a spiral, with the cuts about $\frac{1}{8}$ in. apart. By this method, depending upon the size of the tube, rubber bands upward of 75 ft. long are easily obtained; they will be found very powerful and lasting.—A. D. Keogh, Springfield, Ohio.

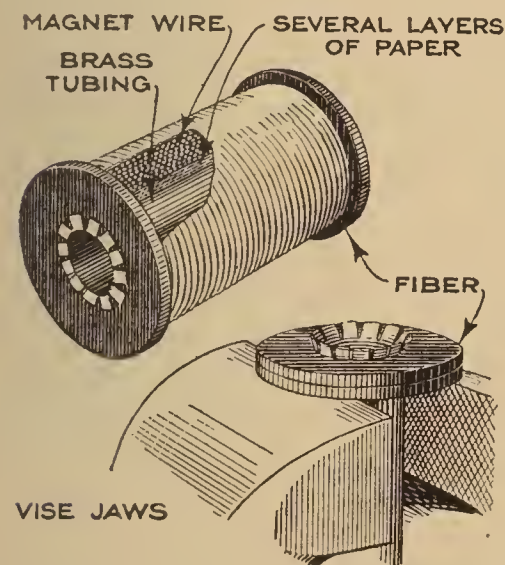
Rejuvenating Old Floor Rugs

When the floor rug has become so much worn as to show holes, or other signs of decreasing usefulness, it may have its life lengthened by a simple process. Turn the rug upside down, and, after sewing or gluing pieces of burlap over any holes or thin spots, make a paste of common gloss starch, thinned to the consistency of paint, and thoroughly saturate the upper surface of the rug, brushing it smooth and even. When the starch has dried thoroughly, apply a ground coat of any good floor-graining varnish, and when this has hardened, the second, or grain-ing, coat is applied, followed, when dry, with a coat of floor varnish.

Handy Spools for Coil Winding

A good substantial spool is the first step in winding any coil for an electro-magnet, if it is to be prevented from collapsing or "loosening up."

Get a piece of brass tubing a little longer than the finished coil is to be; thin brass tubing is best, but if it cannot be had it is entirely possible to make one



from a piece of sheet brass. The joint need not be soldered, although this is advisable.

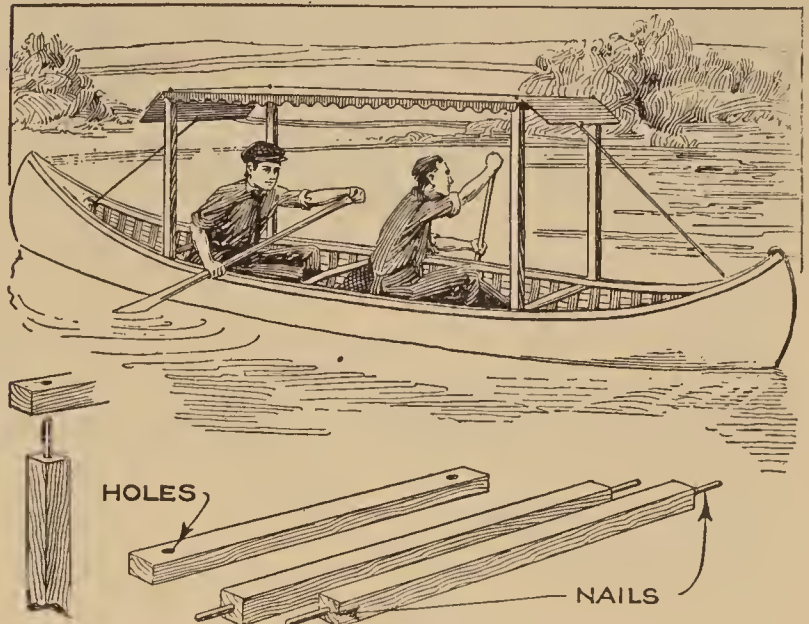
The ends of the tube are slotted for a short distance with a hack-saw, as shown in the drawing, to form lips which are

bent over the coil ends and serve to hold them securely in place. The coil ends are preferably made of fiber in the form of washers, with the hole at the center just large enough to slip over the ends of the tube. The lips are bent over at right angles, and care should be taken to see that the ends are perpendicular, as failure in this respect is sure to make it difficult to wind the coil evenly.

Several layers of paper are glued or pasted around the core, shellacked, and allowed to become thoroughly dry before starting the winding, and the coil, when wound, should also be wrapped with one or two layers of shellacked paper to protect the wires from injury.—Curtis Ralston, Springfield, Ohio.

A Simple Canoe Awning

Canoeists are familiar with the disadvantages of their craft in the lack of protection from the burning effects of the



A Neat Awning for the Canoe Adds Greatly to the Pleasures of Such a Boat. This Awning can be Stowed Away Compactly and Set Up in a Few Minutes

sun. However, a very neat and effective protection is afforded by an awning of the type shown in the drawing.

The awning consists of five pieces, the canvas awning and four removable uprights. Naturally, no dimensions can be given, the awning being made according to the length and width of the canoe. The uprights are made of 1-in. square material, rounded at both ends to fit into $\frac{1}{2}$ -in. holes in the thwarts, or gunwales, and into the stretcher across the top. If it is not desired to drill holes in the canoe to hold the awning supports, there are various types of sockets that can be bought or easily made. The canvas awning strip has a stretcher inserted through a hem at each end, and a light rope is tied to the awning, as indicated. After the uprights are in position, the awning is stretched across them, and the ends of the ropes are made fast through conveniently located screweyes. An awning of this, or any other type, positively should not be used in waters where danger of sudden wind exists.—H. E. Mende, Irvington, New Jersey.

Removing Enamel Insulation

Amateur electricians have their troubles winding coils with enamel-coated wire, particularly with the finer sizes, as it is very difficult to scrape off the insulation without breaking the wire. By passing the wire through the flame of a gas burner several times, the enamel will be melted, and will drop off.—Paul I. Schmidt, Meno, Oklahoma.

Smoking Out Underground Animals

A woodchuck or other burrowing animal cannot remain long underground if the device shown in the drawing is used.



"Smoking Out" Woodchucks, Rabbits, and Other Burrowing Animals is Greatly Simplified by Using an Apiculturist's Bee Smoker

A funnel-shaped cardboard cone, about 1 in. in diameter at the small end and large enough to cover the opening of the burrow at the other, is connected to a beekeepers' smoker by an 8 or 10-in. length of garden hose. The smoker is filled with rags and lighted, the large end of the cone being placed over the hole and a wet gunny sack packed around the cone and hole. With the rags burning and making a good smudge, the bellows of the smoker is worked, to drive the smoke down into the burrow. A little of this treatment will speedily bring any animal out of his "emergency" entrance, dazed and stifled.—Truman R. Hart, Ashtabula, Ohio.

Growing Large Grapes

By making use of a method not widely known, fruits of large size can be obtained from trees and vines. The idea is based on certain characteristics of the sap flow in the plants. The sap that contains the plant nourishment goes up in the outer cells of the sap wood; it descends late in the season, not through the same cells but through the large so-called sieve cells of the inner bark.

A prize-winning bunch of grapes was produced by an application of this knowledge in the following manner: The grower first selected a perfect bunch of grapes growing from a good, strong cane; next, he cut off all bunches above it on the same cane, and just below the selected cluster the cane was girdled, the bark being removed in a band about 1 in. wide.

A paper bag was then pinned over the bunch.

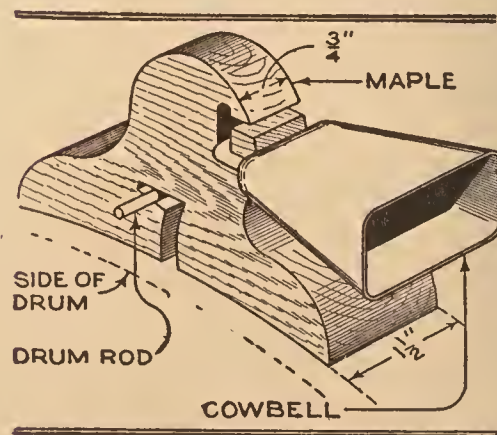
When the sap started back along the canes to the roots, it would be richly laden with the starch manufactured by the leaves. Ordinarily this nourishment would go largely to the roots, there to be stored. In this case, however, the ring of bark that was removed acted as a dam, beyond which the downward-flowing sap could not pass. Consequently the sap would be backed up and be converted into fruit, which would naturally be larger than normal.

The professional horticulturist calls this method "ringing," and there are other ways in which it can be applied to special situations. It is a fact observed by fruit growers that a very heavy crop which bends the branches of an apple tree far down, seems to establish the bearing habit so that afterward the tree will bear unusually well. The scientific explanation is that the bending down of the branches has constricted the inner bark, and the downward flow of sap is distinctly below normal.

A selected branch of a fruit tree can be made to bear better by twisting a wire around it. A young apple tree can be brought into bearing earlier than normal in the same manner, and a backward pear tree can be stimulated to fruit by weighting down the ends of the long branches in summer and throughout the dormant winter period. This will often force productiveness the next year. The secret of the abnormally large pears, apples, and other fruits grown on dwarf trees lies in this general principle; an imperfect union at the grafting point prevents the normal downward flow of sap, and the dammed-up plant food goes into fruit.

Cowbell Holder for Drum

The trap drummer of an orchestra uses a holder for his cowbell that slips over



one of the tightening rods of his drum, both the holder and the bell being almost instantly removed.

Hard maple is used for making the holder, and

two slots are cut for attachment to the drum and for holding the bell, the under-

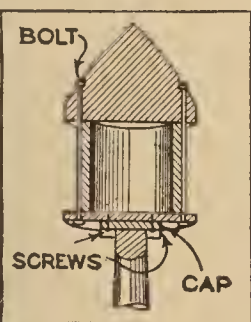
side of the block being curved to conform to the drum shell. The maple block gives a better, clearer tone than the same article made of metal.—M. E. Duggan, Kenosha, Wis.

Paste for Mounting Photographs

A good paste for mounting photographs is made by mixing 12½ oz. of white dextrin in 15 oz. of water, and then adding 2 oz. of sugar, ½ oz. of powdered alum, and ¾ oz. of carbolic acid. The ingredients are thoroughly stirred until they are evenly mixed and no lumps remain.—Robert Page Lincoln, Minneapolis, Minnesota.

Hollow-Log Bird Houses

Using sections of hollow logs, bird houses that are far more attractive than almost any kind made of boards, are easily made by those who delight in watching their feathered friends.



The type shown in the drawing is made from a length of log mounted on a pole. The piece of log is thoroughly cleaned of all

rot and is held in place between the circular bottom platform and the solid top with long bolts, as indicated in the illustration.

The thickness of the walls will be determined to some extent by the amount of sound wood in the interior of the log, although if this is too thick, it can be cut down by using a carpenter's gouge. Holes are drilled through the sides, and the interior may be divided off into several compartments by suitable partitions.

Most pleasing proportions are obtained with a bird house of the type shown, when the section of log forming the body of the house is about 2 in. longer than its diameter, the height of the cap or top being made a little less than that of the walls. Such a bird house can be mounted on the end of a pole, as shown, or, by putting a screweye into the center of the cap, suspended from a tree branch.

Old dry cells may be used as weights for closing doors, and similar purposes.

Making a Catamaran Raft

A simple raft, that will meet the requirements for an inexpensive and simple



A Useful Boat, Built of Logs as a Catamaran Raft, Takes the Place of a Regulation Rowboat When the Latter is Not Easily Obtained

boat, can be made from two or three logs in the manner indicated in the drawing.

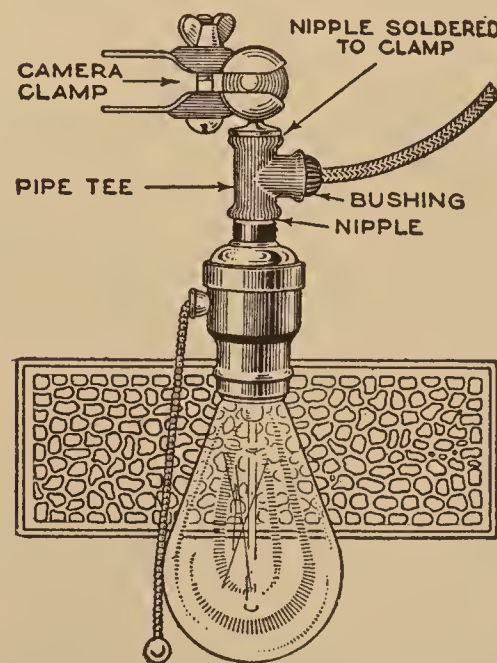
Two logs, about 12 ft. long, are used for the sides, and connected with cross-pieces, spikes or wooden pegs being used to secure the parts together. A piece of split log answers for a seat, and two forked branches, inserted into the sidepieces, make satisfactory oarlocks. In the absence of regulation oars, pieces of board can be cut to approximately the proper shape.

An Adjustable Reading Lamp

An adjustable lamp that can be carried around in the traveling bag and attached to a dresser, chair, or bedstead, can

be easily and cheaply made from a camera clamp of the type shown in the drawing.

The threaded stud of the clamp is soldered into a short nipple that is screwed into the pipe tee, the lamp socket being attached by another nipple to the opposite

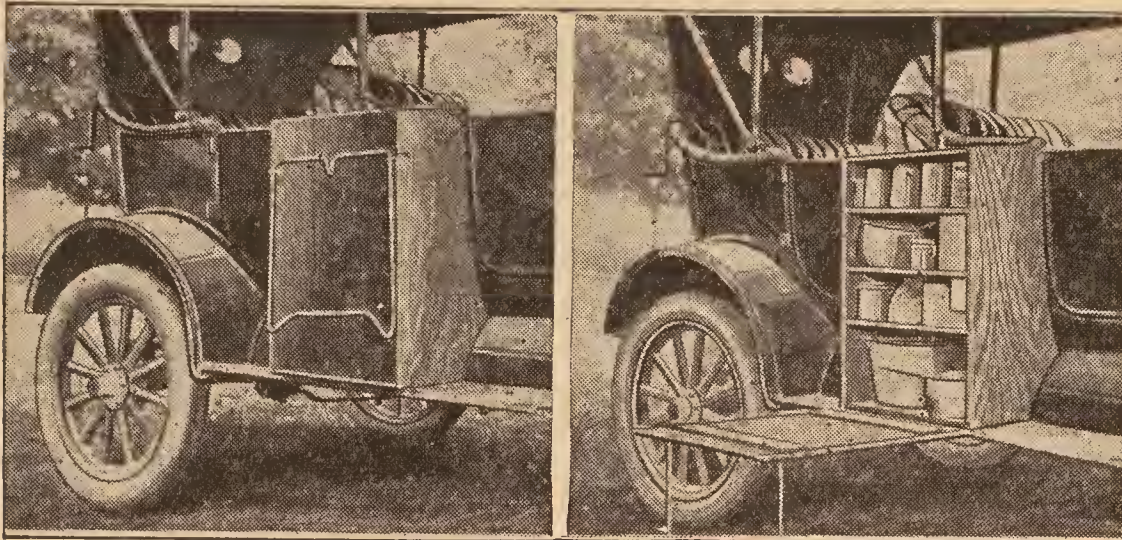


end of the tee. The lamp cord is led to the socket through the side opening of the tee, as indicated.—P. L. Lowry, Brooklyn, N. Y.

An Automobile Kitchenette

The automobile kitchenette shown in the accompanying photographs was used during a 3,300-mile tour, with the utmost satisfaction.

The box is made of wood, and the sides are cut to follow the curve of the body of the car, a piece of tin being used for the back. The cover is hinged at the bot-



An Automobile Kitchenette Constructed at a Cost of Less than a Dollar: The Picture at the Left Shows the Appearance of the Box When Closed, with the Table Support Folded. At the Right, the Cabinet Is Open

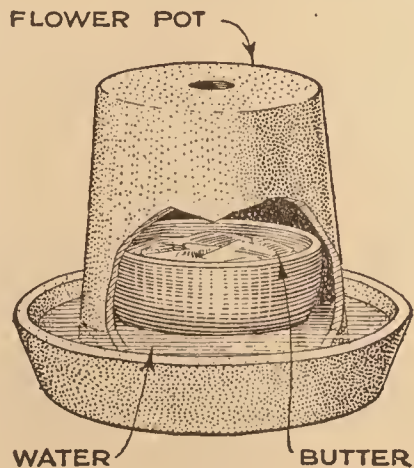
tom and drops down to form a table, the legs of which are made of a piece of $\frac{1}{4}$ -in. round-iron rod, bent as shown and fastened to the door with staples. Bolts are used for attaching the box to the running board, while a U-shaped strap at the top passes over one of the brackets supporting the top bow.

The cost of the whole arrangement, including the paint, did not exceed a dollar.—Harry E. Forbes, Van Wert, Ohio.

A Flowerpot Refrigerator

An ordinary unglazed-clay flowerpot can be used for keeping butter and similar articles of food cool in hot weather.

The dish containing the food is set into a larger dish, as shown in the drawing, and the flowerpot is inverted over it. Water is poured in the larger dish and the whole arrangement is set in some place where there is a free circulation of air. The porous clay pot absorbs the water, which, rapidly evaporating, keeps the contents of the food dish sweet and cool for a reasonable length of time.—C. A. Pease, Monrovia, Calif.



Obtaining Red Tones on Prints

To obtain red tones on photographic prints, it is much better to procure the desired color by chemical means than by dipping in a dye solution. By the former process the whites are left clear, but, when using dyes, the whites are inevitably stained.

The prints are first bleached out in a solution of 7 oz. distilled water, 100 gr. potassium bromide, and 75 gr. potassium ferricyanide (poison). The bleached prints are then transferred to a sepia-toning solution, composed of 25 gr. sodium sulphide in 10 oz. of water. The operation can be stopped here, and the prints washed and dried in the usual way if a sepia tone is desired. An additional solution is required to impart the desired red

tone. This solution is composed of 10 gr. gold chloride and 100 gr. of ammonium sulphocyanide, dissolved in 10 oz. of pure water. The prints are allowed to remain in this bath until the desired tone or shade of red is obtained, when they are removed, washed, and dried.

Coins Used for Weighing

In photographic laboratories and other places where small quantities of chemicals or other materials are measured by weight, ordinary coins can be used for weights.

A copper cent weighs 50 gr., a nickel 80 gr., a 10-cent piece 40 gr., while a quarter and a half dollar weigh respectively 90 and 190 gr. A slight allowance should be made if the coins are badly worn or "slick." It should also be borne in mind that apothecary's weight, which consists of 480 grains to the ounce, is generally used in the preparation of photographic chemicals.

Keeping Coffee Hot

To keep a cup of coffee hot for a longer period, the cream and sugar should be added as soon as possible after the coffee has been poured. The cream and sugar absorb a certain amount of heat which would otherwise be dissipated as the beverage cools.

Making High Frequency Oudin and Tesla Coils

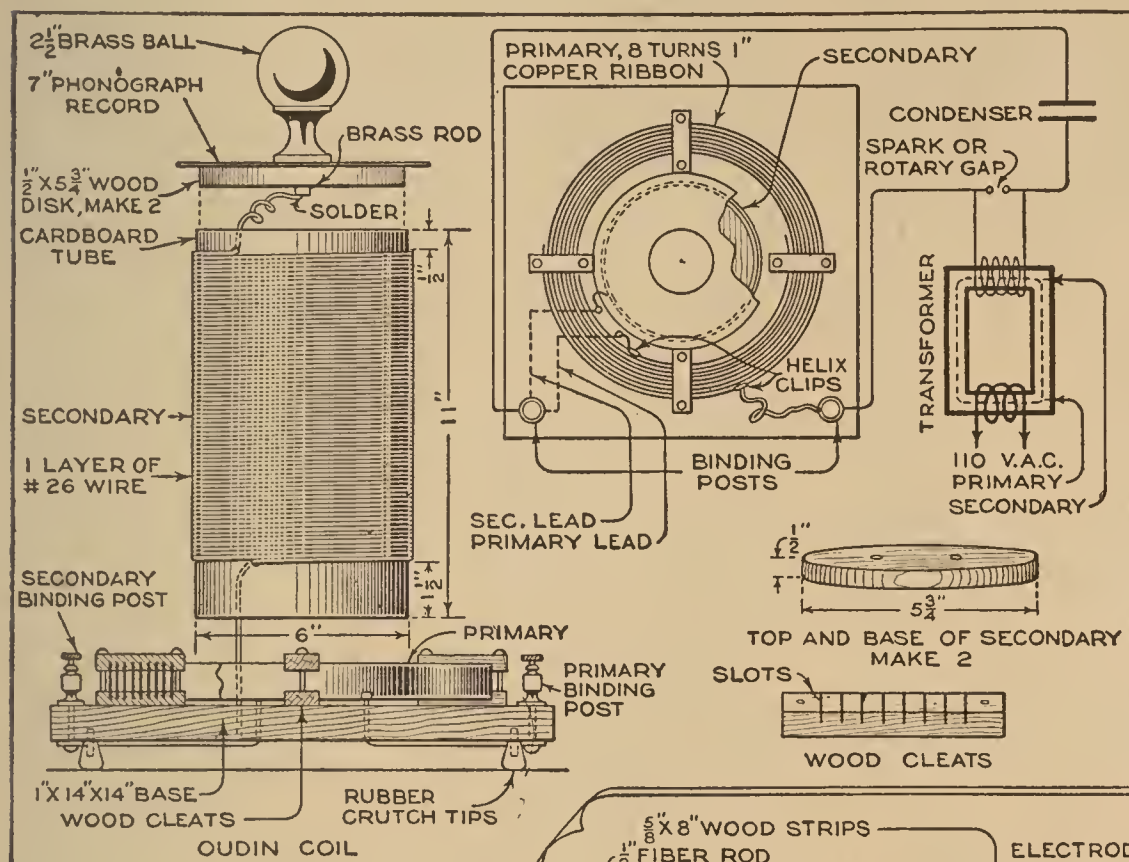
By F. L. BRITTIN

HIGH-FREQUENCY coils are easy to make, and the materials are, for the most part, to be found around the average radio laboratory. Most experimenters want either an Oudin or a Tesla coil, and as they usually have all other necessary equipment on hand, such as transformers, high-tension condenser, and rotary gap, it is comparatively easy to gratify their ambition.

The wooden disks, as shown in the drawing, are made to fit into the ends of the secondary; the bottom disk is screwed to the base, and the top one is drilled through the center to accommodate the brass rod leading to the ball, and is then attached to the tube. A neat cap for the coil is made from a 7-in. phonograph record; the hole at the center being enlarged to take the brass rod, and small holes being drilled at opposite points for the small round-head wood screws which are used to fasten it to the wooden disk.

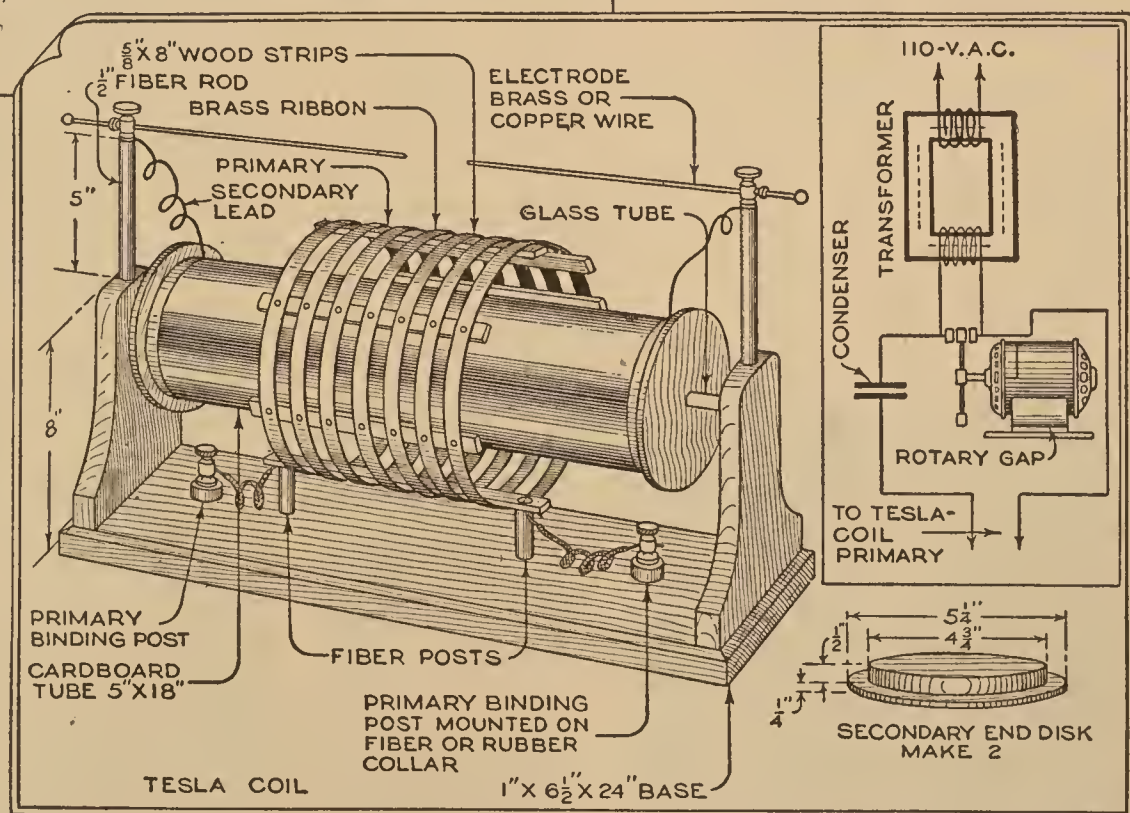
Almost any junk yard will yield the brass ball, which is of the type commonly used on metal bedsteads.

The base is preferably made of hard wood, which may be finished as desired; it is supported and, at the same time, insulated by rubber crutch tips, which are fitted over wooden pegs, one at each corner.



The Amateur Radio Operator of Limited Means need Not Deny Himself Necessary High-Frequency Coils

To make an Oudin coil, a cardboard tube, 6 by 11 in., is needed for the secondary; this is given two or three coats of shellac, and when the last coat has dried, a single layer of No. 26 double silk-covered magnet wire is wound on. Start the winding $\frac{1}{2}$ in. from the upper end of the tube, first fastening the end and allowing a loose end, of about 8 in., for connecting to the brass rod. Wind to within $1\frac{1}{2}$ in. of the lower end. Small holes are made in the tube at the start and finish of the winding, and the loose ends of wire are pulled through and fastened. When the winding has been finished, it is given a coat of shellac, which is allowed to dry thoroughly before proceeding further.



Oudin and Tesla Coils may be Made of Such Simple Materials as Cardboard Tubes, Discarded Phonograph Records, Scraps of Brass, Wood, and Fiber

The secondary having been completed and connections made, the maker must direct his attention to the primary winding. This winding consists of eight turns of 1-in. copper ribbon, which is held to the base by four wooden cleats, as indicated; these cleats are slotted, to separate the individual turns from each

other. Flexible leads, with helix clips attached to one end, are connected to the binding posts, as indicated, to complete the instrument. Using a $\frac{1}{2}$ -kw. transformer and a regular single-unit, oil-immersed, high-tension type condenser, sparks from 10 to 16 in. long can be drawn from the coil, which is connected in circuit as shown in the diagram.

The Tesla-type coil is simple to make and operate, and consists of a secondary winding of a single layer of No. 28 single cotton-covered magnet wire over a well shellacked 5 by 18-in. cardboard tube. After the winding has been applied, it is given two coats of shellac, each of which is allowed to become thoroughly dry. The wire is wound around the tube to within 1 in. of each end, and two small holes are punched through the cardboard at the terminals, for drawing the wire through and fastening it. After the wires have been looped and made fast to the tube, the ends are brought to the binding posts and soldered. The secondary end disks are turned to fit the ends of the tube snugly, and are drilled through their centers to receive the $\frac{3}{4}$ -in. glass rod, or tube, which is supported in blind holes in the endpieces; this glass support is 21 in. long; if glass cannot be obtained, a wooden rod of the same dimensions will answer as well. The end

blocks supporting the coil are drilled at the center of their upper edges to take $\frac{1}{2}$ -in. rods of fiber, to the upper ends of which the secondary binding posts are screwed, as shown.

Seven turns of $\frac{1}{16}$ by $\frac{5}{8}$ -in. brass ribbon form the primary, the separate turns of which are held apart by means of wooden strips, or cleats, to which the ribbon is fastened with small tacks or screws. The terminals of the primary are brought out and fastened to the bases of binding posts, which are elevated from the wooden base on short posts of hard rubber or fiber. Similar fiber posts, fastened to one of the cleats, are used to support the primary, and keep it properly spaced with relation to the secondary. The wooden parts of the instrument are made from yellow pine to the dimensions shown in the drawing, and finished with black asphaltum paint. The wire electrodes slide back and forth through the secondary binding posts, and regulate the length of spark as desired. A Tesla coil of this type is very powerful, and with it many interesting experiments with currents of high frequency can be performed without difficulty. The circuit in which a coil of this kind is used requires the same type of condenser as that shown in the wiring diagram of the Oudin coil.

Display Rack for Electric Lamps

In order to display the various sizes and styles of electric-lamp bulbs carried in stock, a western dealer uses the display rack shown in the photograph.

The rack is made of metal tubing, the

wires being concealed inside, and pull-chain lamp sockets are used so that the customer can operate them easily, although key sockets may be used, if desired.

This arrangement saves much time for the dealer, making it unnecessary to take bulbs from

shelves, open packages, and place one after another in a socket; in addition, the customer is able to compare the light given by the different bulbs fairly, because he can see them burning side by side.—John A. Ford, Los Angeles, California.

Beech Leaves to Stuff Beds

Dry beech leaves make an excellent material for stuffing beds, as they are surprisingly springy and comfortable. The dry leaves are gathered in the fall and may be mixed with other leaves, but beech should predominate. The leaves have an agreeable odor and will not harbor vermin.—S. Leonard Bastin, Bournemouth, Eng.

⌚Special care should be given to the storage of oxygen and acetylene tanks. Acetylene is classed as an explosive with other hydrocarbon gases, and only a limited number of containers should be stored in one place. Oxygen tanks should be stored in a separate place from acetylene tanks.



Washbasin for Camp or Summer Home

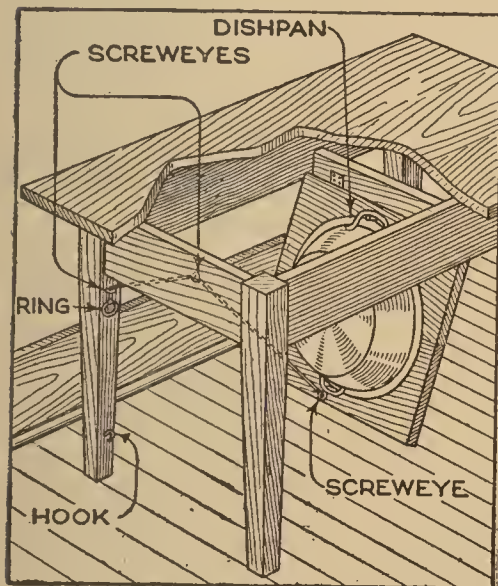
A stationary washstand that lacks only the refinements of the home article, can be installed in any summer home or camp, and fitted with drainpipes, at a very slight expenditure of money or effort. A tin washbasin of any convenient size, and the proper amount of tin speaking tube and fittings are all the materials needed. The speaking tube comes in lengths of about 5 ft. and is so formed that the sections fit into elbows, tees, and the like. A hole is cut in the bottom of the basin with a chisel, smoothed with a half-round file, and an elbow soldered to the bottom. The basin can be supported in a frame made from an old box, and the drainpipe is run outside the house into a pit.

Handle Grips Made from Old Tire

Rubber handlebar grips for bicycles or motorcycles are more or less expensive, and an acceptable substitute can be made by cutting suitable lengths from an old nonskid bicycle tire.—Clay Hewes, N. Chatham, N. Y.

Keeping the Dishpan from Sight

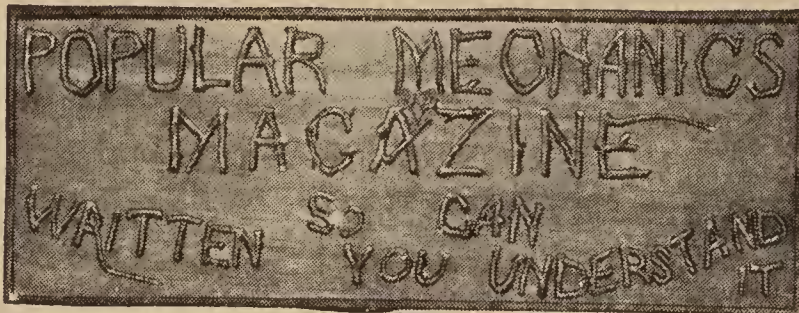
The household dishpan doesn't seem to fit properly anywhere, and its disposition



tion furnishes something of a problem to the mistress of one of the present ideas in "apartments." The drawing shows clearly, how, in one instance the dishpan has been concealed, when not in use, under a table, although the same idea might even be more satisfactorily applied to the underside of the sink drainboard. The pan rests on a hinged board under the table, is held in place by properly placed pegs, and is raised to, or lowered from, its place of concealment, by a light wire or string passing through screweyes. A ring on the end of the string is slipped over a hook on one of the legs when the pan is in place and hidden from view.—Lloyd R. Dickens, Stratford, Ont.

Artistic Rustic Signs

As signposts to guide visitors to camp sites, or for other like purposes, nothing



Rustic Signboards That Are in Entire Harmony with Their Surroundings at the Summer Home or Camp, can be Made from Twigs Tacked to a Board Support and Finished in an Appropriate Manner



serves the purpose, or harmonizes with the surroundings, quite so well as a rustic sign of some sort. Two examples of such work are shown in the engraving; the larger one shows a very attractive piece of work made from poplar twigs tacked to a light board, the whole being finished off with a coat of shellac or varnish. The smaller picture shows a similar sign in which heavier material has been used. Enough small nails should be used, when tacking the twigs in place, to prevent the bark from peeling off.

When Spark Plugs are Oil-Clogged

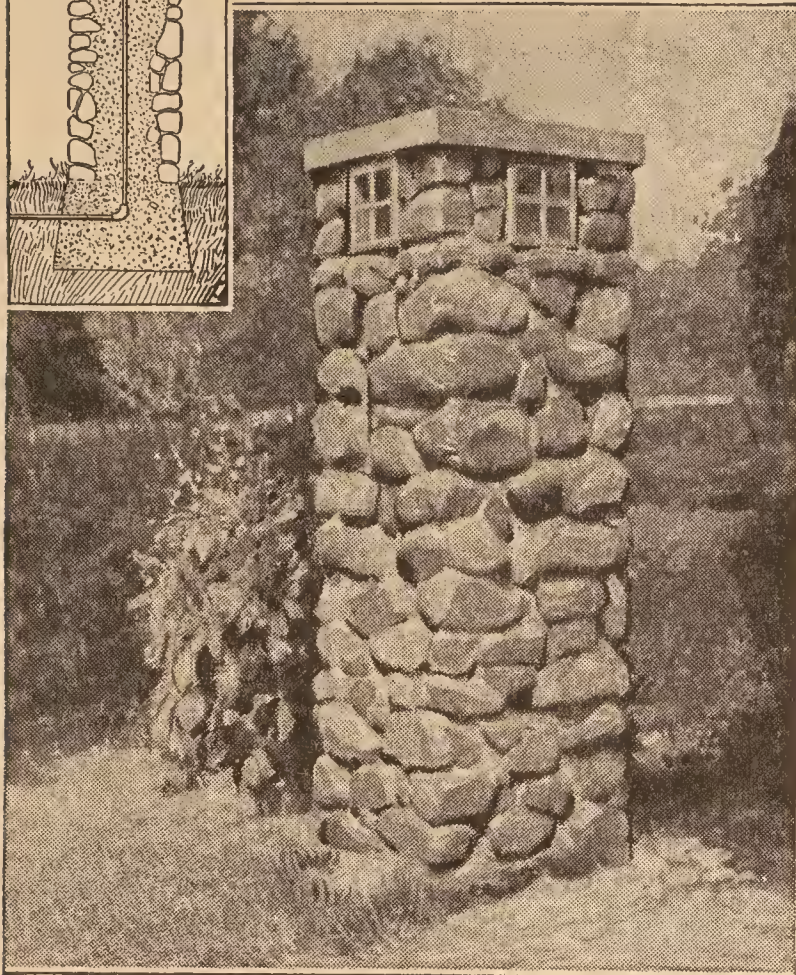
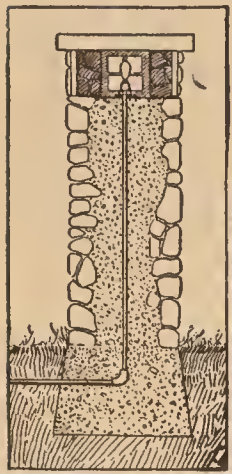
Frequently some one cylinder of an automobile engine is subject to excessive oil leakage, with the result that the spark plug fails to fire. While a fresh plug will start the cylinder firing, this is not always at hand. By shifting the troublesome plug from one cylinder to another, the trouble may be overcome, temporarily at least. Where the cylinder fires regularly, the plug seldom needs cleaning, as the dirty plug will be gradually cleaned by the heat of combustion in the cylinder.—G. A. Luers, Washington, D. C.

Gathering Dead Leaves

A 5-ft. square of cloth, having light sticks of equal length tacked to opposite sides, makes a simple device for gathering dead leaves quickly and easily. The leaves are first raked into piles in the usual manner, and are then gathered by holding one of the sticks at the base of the pile on one side and passing the other over and under the heap.—Oscar C. Place, Boulder, Colo.

An Illuminated Gatepost

A pleasing and substantial gatepost, built of concrete and field stone and provided with an electric lamp, such as shown in the photograph, gives the visitor and passer-by a pleasant im-



An Electrically Illuminated Gatepost of Concrete and Field Stone Provides an Attractive and Substantial Entrance to Public or Residential Premises

pression. The foundation may be either concrete or stone sunk into the ground, with a flare at the bottom as indicated in the insert. When laying the foundation, provision should be made for the pipe conduit through which the wires are led to the light.

In forming the post of concrete, the central part can be poured in an ordinary box form and later faced with masonry, as desired.

Each of the four windows is about 6 in. square. Three of them are of the fixed-sash type, and the other is provided with a hinged door for renewing the bulb as may be necessary. A stone or concrete slab, about 2 in. thick, is used to cap the post, and this overlaps about 1 in. on each side.

The light is controlled by a switch located in the house or at any other convenient point.—Frank W. Harth, Bayside, Long Island.

¶ If a cupboard door that is held shut by friction alone becomes loose, stick a large thumbtack in the edge.

Novel Uses for the Hectograph

The hectograph, as an office convenience, is well known, and some workers have utilized it as an aid in certain kinds of drawing, where a number of copies are required. Anyone who has worked with tracings knows how soon the paper wears out and how the finer details are lost or altered. The hectograph makes many copies before a new drawing is needed and is particularly desirable in reproducing detail and insuring uniformity. It can do still more, and reproduce flat washes of its various inks, red, green, violet, and black. In spite of their crude aniline character, these inks, when thinned a little and used with discretion, give flat tones equivalent to a first wash which it is easy to bring up to the right shade with water color or crayon; it will even reproduce colors made with certain of the package dyes.

Hectographs, with directions for using, are obtainable at office-supply stores in various sizes; but as they are rather expensive in the larger sizes, the experimenter can make his own hectograph from the following recipe: white glue, 4 oz.; water, 8 oz.; glycerin, 8 oz. Dissolve the glue by setting the vessel in boiling water until the glue is thoroughly liquefied and at this point add the glycerin, mixing thoroughly and straining through a fine screen into a shallow pan, preferably square or oblong in shape. Before using, the mass should be allowed to cool about six hours or until it is a firm jelly. This mixture works best at a temperature of 70 to 75°. For hot-weather use it would be advisable to add about ½ oz. more glue.

In preparing drawings for reproduction, use a fine pen and draw firmly and evenly, using just enough ink to make a full, glossy line. Allow the ink to dry thoroughly before placing the drawing on the hectograph. Use paper with a firm texture and of sufficient surface to prevent absorption of the ink. When making drawings of buildings, or other objects where more or less accuracy is desired, the hectograph-ink drawing may be made on tracing paper or on the photograph or blueprint itself, although the paper of the latter is a little too absorbent. In making flat washes, get the ink on evenly with the first few strokes of the brush, or the result will be patchy to work over. In printing candle shades, only half of the design need be drawn, if care is used in registering and printing. Any part of a design may be stopped out by laying a

bit of paper over it while printing. In applying a wash over the printed tone, work quickly, with the brush not too wet, to avoid spotting and spreading the ink beneath. Small outline drawings, especially, if made in one or two colors of ink, can often be used without retouching, for place cards, invitations, announcements, and the like.—Corinne Rockwell Swain, Philadelphia, Pa.

Swing Made from Machine Seat

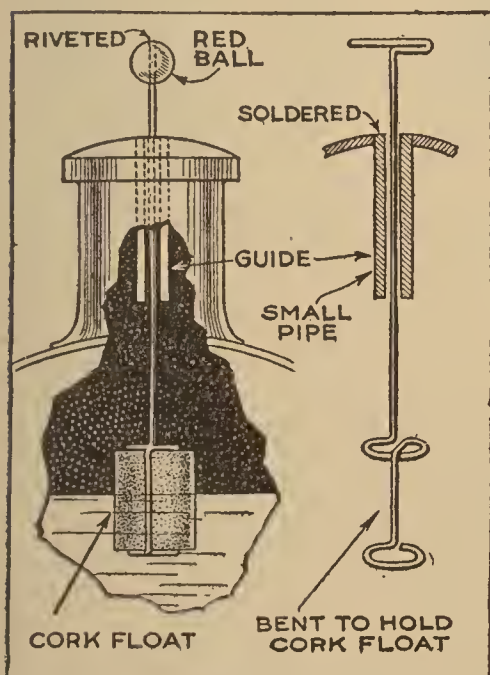
A stamped metal seat, such as used on mowing machines, can be converted into a neat and substantial children's swing. Two holes are drilled at opposite points into the front and rear edges of the seat, which is then suspended from a tree or ceiling by means of chains.—Mrs. Ruth Darling Shultis, Greeley, Colo.

Eliminating Dampness in Closets

Closets and cupboards that have a damp, musty odor can be sweetened by placing a dish of unslaked lime (quicklime) inside. The lime will absorb the moisture, gradually slaking itself; as this occurs, fresh lime should be added. The lime also can be used in refrigerators.

Low-Water Alarm for Auto

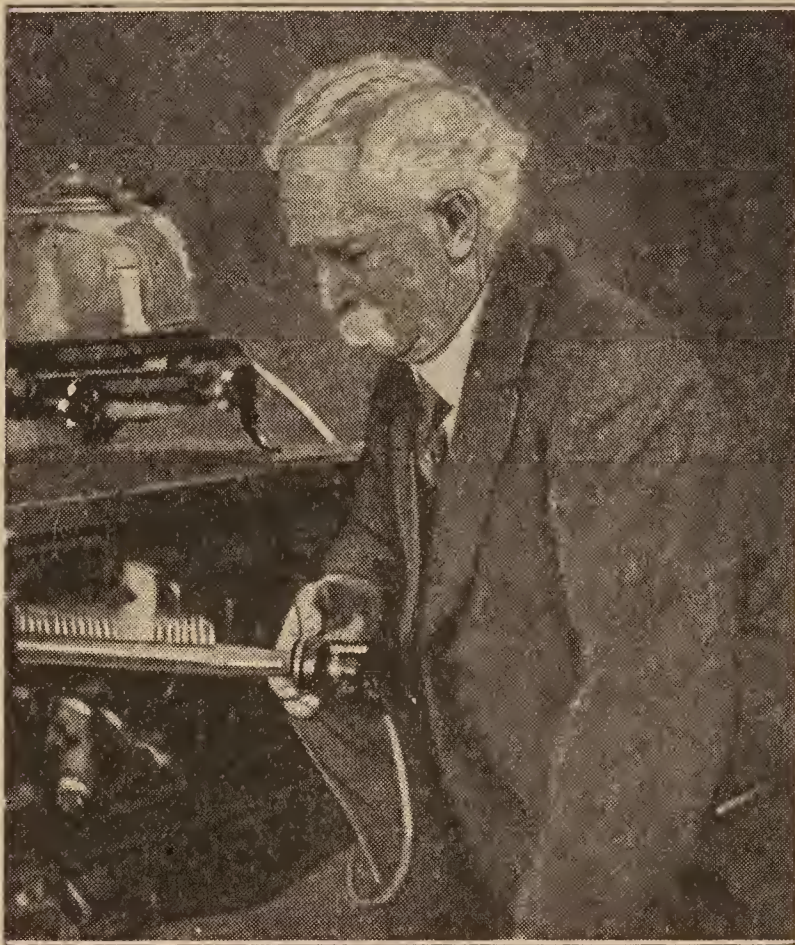
A simple attachment for indicating the amount of water in an automobile radiator, and which also indicates boiling, consists of a float attached to the filler cap.



A shell-lacked-cork float is attached to the end of a piece of brass wire, led up through a short tube, and through a hole in the filler cap, the tube being soldered to the underside of the cap. The upper end of the wire can be simply bent over, or fitted with a bright-colored wooden bead, the position of which serves to indicate the water level in the radiator, or, by its violent movement, giving warning of the water boiling.

Attachment for Stove Heats Water

To make the coal-burning cookstove in his home suitable for heating water the year round, whether coal is burned



The Burner from an Old Gas Stove, Used to Heat Water, Dispenses with the Need of Maintaining a Coal Fire in the Coal-Burning Cookstove in Hot Weather

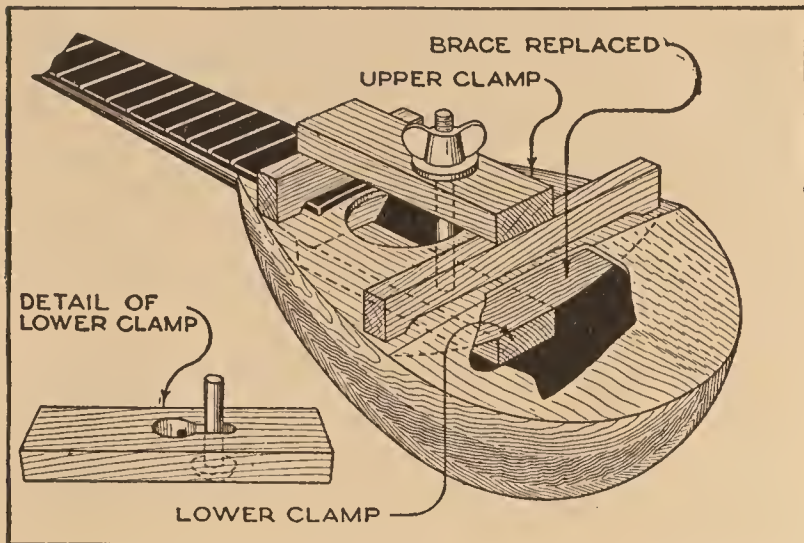
in the stove or not, a westerner has devised a simple gas attachment, by means of which the water can be heated with gas when it is not desirable to use the ordinary fuel.

This attachment consists of an ordinary burner taken from the oven of an old gas range; it is about 15 in. long and is connected to a convenient gas jet with a rubber tube. In hot weather, when warm water is wanted, the burner is laid in the firebox and lighted, instead of building and maintaining the coal fire. The flames come in contact with the heating coil of the "water back," and the water is heated quickly. When it is desired to return to coal or wood, the burner is lifted out of the firebox and laid to one side. This attachment, properly supported under the grate, may also be used as a substitute for paper and sticks when lighting the coal fire, thus saving much labor.

ⓘ When oil ignites, do not attempt to quench it by throwing on water; this merely spreads the flame. Throw on sand or sawdust in sufficient quantities to exclude the air; this will smother the fire.

Repairing a Broken Mandolin Brace

Permitting a mandolin to remain in a damp place resulted in a broken brace and a caved-in top, due to the pressure



Repairing a Broken Mandolin Brace and a Caved-In Top without Having to Send the Instrument to the Factory, by the Use of a Simple Wooden Clamp

of the strings on the bridge. The brace, located directly underneath the bridge of the instrument, could not be reached on account of the small size of the hole in the sounding board, which added to the difficulty of making a repair. After two or three unsuccessful attempts at repair without special preparation had been made, the following method was used successfully.

A clamp was made, as in the drawing, from $\frac{3}{4}$ by 2-in. hardwood, with a lower piece, about 6 in. long, provided with a block on one end, and a hole and slot in the center. The upper part of the clamp was made with a similar block at one end cut out to clear the fingerboard, and a bridge, fashioned to rest on top of the instrument near the edges, on the other.

Using the broken pieces of the old brace as a pattern, a new one was made, and, holding the mandolin upside down, the brace, well smeared with glue, was placed as nearly in the proper position as possible. The lower half of the clamp, inserted through the sound hole, was placed with the block resting under the end of the fingerboard. The head of a $\frac{1}{4}$ -in. bolt was inserted through the hole, secured by sliding into the narrow slot, and then fastened through the upper half of the clamp with a wingnut. After adjusting the upper clamp so that one block bridged the fingerboard and the other end rested on the edges of the instrument, the wingnut was given a few turns, bringing the brace back into position, and the top of the mandolin with it. When the glue had been allowed to harden properly, the clamp was removed.—C. M. Vail, San Francisco, Calif.

Roller Skate Aids Crippled Cycle

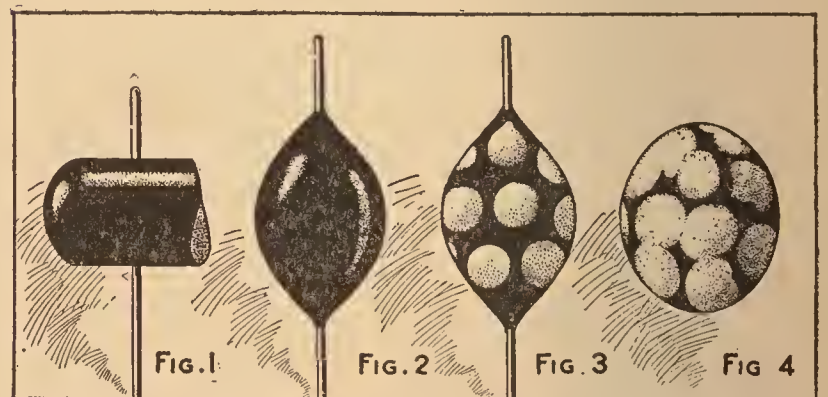
As he was about to start for school on his bicycle, a schoolboy discovered that the tire of the front wheel was carrying a big tack in the tread. In this emergency he strapped one of his roller skates securely to the rim of the wheel, secured the wheel firmly to the fork, and was able to get to school in time for roll call.

Making Sealing-Wax Beads

Beads of individual design and appearance require no more elaborate or expensive apparatus and materials than an assortment of colored sealing wax, a steel knitting needle, and an alcohol lamp, the latter being used in preference to any other flame, because it leaves no deposit of soot on the wax.

First, break off a piece of sealing wax about the size of the bead to be made, heat the knitting needle and press it carefully into the wax as indicated in Fig. 1. Hold the piece of wax over the alcohol flame, revolving it slowly until an even bead, like Fig. 2, is formed; then dip in water until cool.

Choose colors that blend or contrast well with the wax used in forming the bead. Heat each stick in turn and dot a



Odd and Attractive Effects in Beads are Obtained by Making Them of Differently Colored Sealing Waxes

little of the wax upon the cool bead, as in Fig. 3, and then revolve over the flame again. The wax, when warm, will flow around the bead, intermingling with it, and forming odd and attractive designs, such as the one shown in Fig. 4. Cool the bead as before by dipping in water; dry and pass over the flame again to restore the luster. The completed bead is removed from the steel needle by heating the metal on each side of the bead. When the bead is loose, it is slid back and forth on the needle a few times to make a clean-cut hole.

¶An ever-ready auto creeper can be made by putting casters on one of the car's removable floor boards.

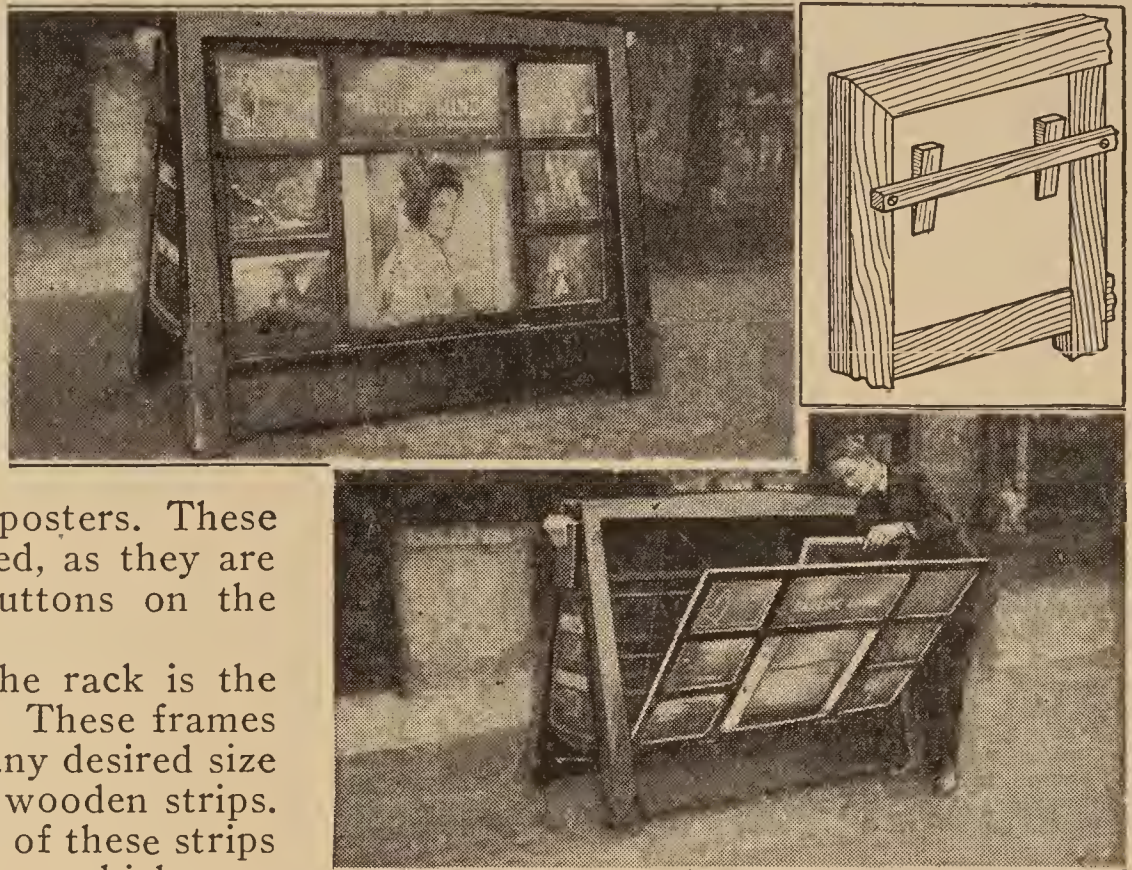
A Well-Designed Poster and Advertising Display Stand

An attractive and substantial rack, or stand, for the display of bulletins and advertising matter of any kind, permits the matter to be easily changed, and protects it from the weather even when it is set in an exposed position.

Built in the shape of a wedge, the holder cannot easily be upset as with the ordinary easel type. A triangular panel, fitted into each end, can be used as a support for small posters. These panels can easily be removed, as they are held in place by metal buttons on the inside.

The special feature of the rack is the hinged frame on each side. These frames are divided into panels, of any desired size and shape, by $\frac{1}{4}$ by $2\frac{1}{2}$ -in. wooden strips. The edges on the underside of these strips are beveled, to hold the glass which protects the display matter from exposure. Midway across each tier of panels wooden strips are fastened to the back of the frame. These furnish simple and convenient holders for wedges inserted be-

hind them in the manner indicated by the small drawing, after the posters, with a suitable cardboard or thin wooden backing, have been inserted. Thus, it is not necessary to use tacks each time a poster is



Open and Closed Views of a Substantial and Attractive Rack for the Display of Advertising: Even When Placed in an Exposed Position the Contents are Thoroughly Protected and the Matter is Easily Changed put in place or removed.—John Anson Ford, Los Angeles, Calif.

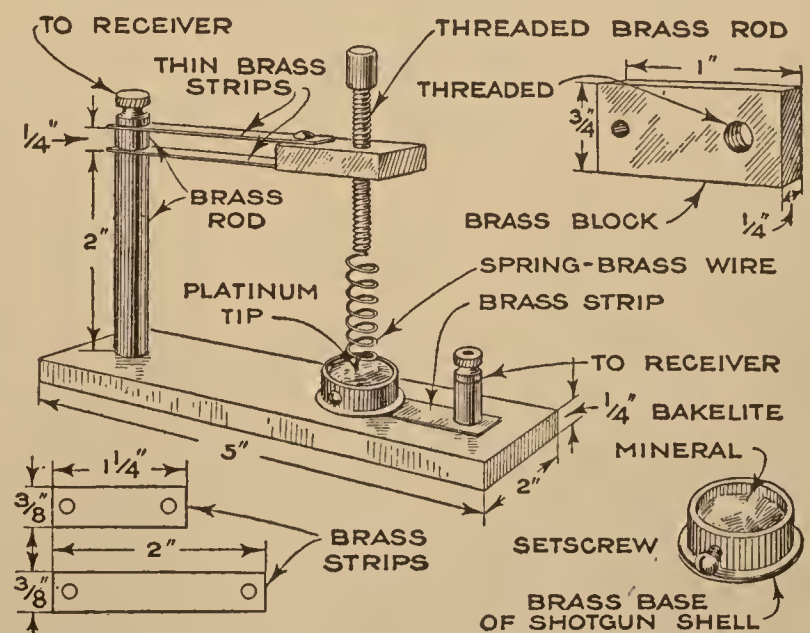
How to Make a Good Mineral Detector

By F. L. BRITTIN

A MINERAL detector should be a part of every radio amateur's equipment, as one never knows when the audion tube may burn out, and this sometimes happens right in the middle of an important message; it is then very handy to be able to switch the mineral detector into the circuit and continue receiving. A good mineral detector is a part of almost all commercial sets, where traffic must go on regardless of accidents. The detector described here is simple to build, and can be constructed from odds and ends about the station.

The base is of bakelite, or may be of any insulating material, $\frac{1}{4}$ by 2 by 5 in.; the upright post is of $\frac{3}{8}$ -in. brass rod, the lower part, 2 in. long, drilled and threaded at each end to take a $\frac{1}{8}$ -in. brass machine screw, the upper part being $\frac{1}{4}$ in. long, drilled through to clear the upper binding screw. This screw is $1\frac{1}{2}$ in. long and serves to hold the two brass strips in place in addition to acting as a binding post, as shown in the drawing.

The small brass block is drilled to take a small bolt, which clamps the brass strips loosely, allowing a side swing to the block. The block is also drilled and threaded to take the knurled-head screw to which the spring wire is soldered; the



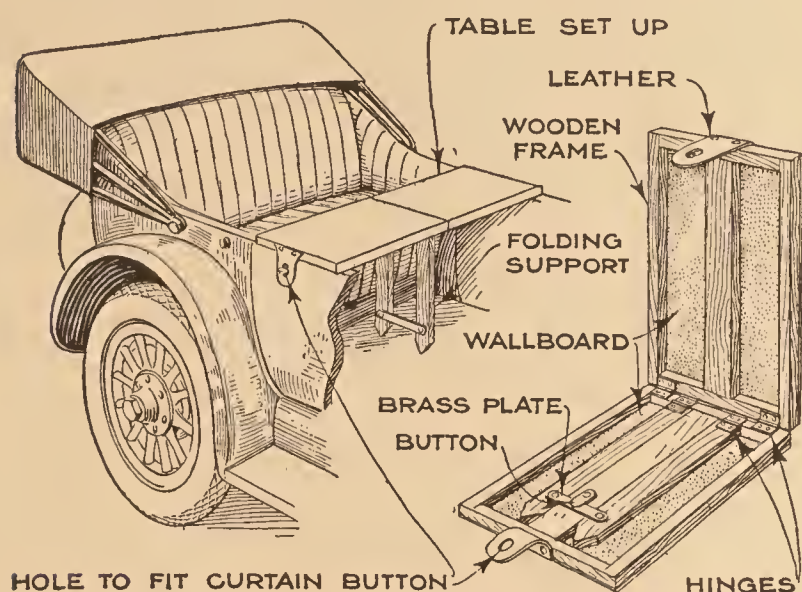
A Simple but Substantial "Cat Whisker" Detector: This should Be a Part of Every Radio Outfit, No Matter How Well Equipped

contact point on this spring should be tipped with platinum, which may be done by a jeweler if the necessary facilities are not at hand. The mineral is contained in a little brass cup, made from the base of an empty shotgun shell. A small hole is drilled through the side of the base and threaded to take a small setscrew, which holds the mineral rigid. The percussion cap is removed from the end of the shell cap, and a short flat-head machine screw holds the cup in place on the base. This screw also holds the short brass strip leading to the other binding post.

The detector is neat and effective, and may be mounted on the receiving panel.

A Convenient Table for the Auto

A family of five persons always takes the lunch basket along when they go for a



A Compact and Convenient Folding Dining Table for the Use of Automobile Picknickers and Tourists

day's outing in the car. It is not always easy to find a leafy bower with a clean, level space on which to spread the lunch, and besides, it is vastly more comfortable and less bothersome to eat in the car.

To add to the comfort and convenience of such trips, the very light and compact folding table shown in the drawing is carried along. The frame is made of $1\frac{1}{2}$ by $\frac{3}{8}$ -in. whitewood, in two parts which are hinged at the middle, while the legs are hinged to one section and joined together near the lower end with a brass plate. The frames are covered with extra-thick pressboard, or wallboard, glued to the wood. Leather tabs are provided at each end, which are attached over the top-curtain fasteners on the edge of the car. The whole is painted or varnished as desired, to make it waterproof and to improve the appearance.—A. G. Rollins, Portland, Me.

☞ Surgeons' adhesive tape can be used for mending tears in raincoats.

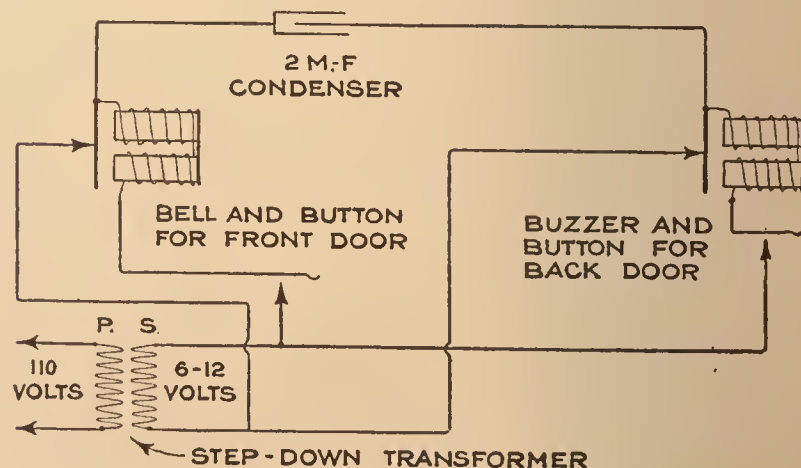
Rust-Proof Coating for Bolts

When the nuts and bolts of an automobile are replaced after an overhauling, it is sometimes the custom to coat them with hard grease or graphite. This is, ordinarily, an excellent practice, as the lubricant permits the nut to be drawn up tighter, and, at the same time, permits it to be removed more easily. Underneath the car, however, there is little that can be applied to the fender nuts, body bolts, etc., that will prevent their becoming so rusted that they can only be removed with difficulty. Some form of paint is frequently used, but this wears off, and the rust continues to accumulate.

Rusting of such exposed bolts can be effectively prevented by dipping both nut and bolt in thin shellac, and applying a little more over the end of the bolt after the nut has been tightened. As this treatment will prevent rusting, the nut can be easily taken off, and as the shellac will, in addition, exert a tendency to prevent the nut from turning, the likelihood of loose and rattling bolts is considerably reduced.

Eliminating Spark on Bell Contacts

After installing a small step-down transformer to operate the bells in my house, I found that the contacts on the bells were sparking badly, and would soon burn out. Shunting a condenser across the contacts to absorb the spark is a common practice, and I decided to do this for each bell. To avoid the necessity of buying another condenser, I devised the method of wiring shown in the drawing; this allows one condenser to serve both bell and buzzer. When the front-door bell is rung, the condenser is connected across its contacts through the contacts on the buzzer, and vice versa. This arrangement does not

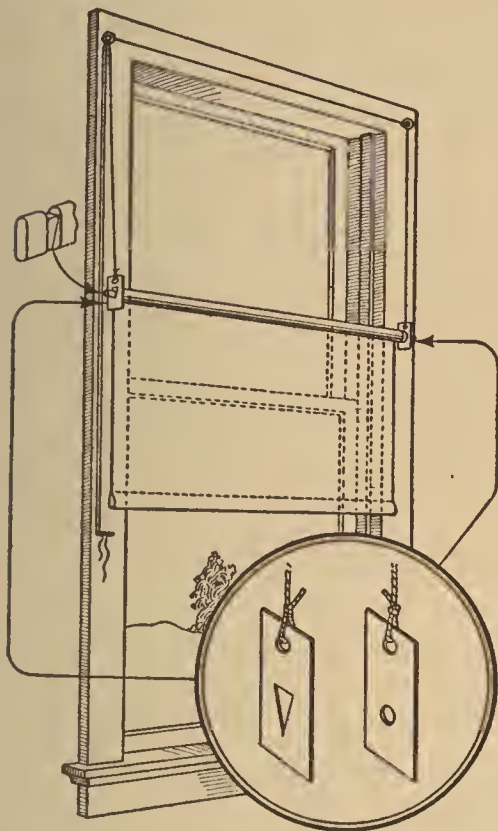


The Condenser Connected across Both Bell and Buzzer, as Shown, Stops Sparking at the Contact Points, Thus Preventing Undue Wear

interfere with the simultaneous use of both bell and buzzer.—C. M. Crouch, Minneapolis, Minn.

Window-Shade Fixture to Admit Light at Top and Bottom

A simple and effective method of hanging a window shade so that light may be admitted from below or above, or both, is shown in the accompanying drawing.



An ordinary shade roller is used; the flat pin at the end of the spring is provided with grooves on each side, and the round pin on the opposite end is pulled out with a pair of pliers and a small round-head screw substituted for it.

Two pieces of sheet metal, $\frac{3}{8}$ by 2 in., are provided, and a $\frac{3}{16}$ -in. hole is drilled in the upper end of each; a round hole is drilled through the opposite end of one piece, and a triangular slot is cut in the lower end of the second piece.

When the two metal brackets have been finished, the flat pin of the roller is inserted into the triangular opening, the filed notches serving to hold it in place, and the opposite end is held in place by the screw. Cords are fastened into the holes provided in the upper ends of the pieces and run upward, one on each side of the window casing, through screweyes at the top. Both cords are passed through the same screweye on one side and down to a hook in the window frame.

As will be apparent, the shade and roller can be raised or lowered to any position by manipulating the cords, the shade being operated in the usual manner.—Mrs. Ruth Darling Shultis, Lansing, Mich.

Waterproofing Tents

Take $\frac{1}{2}$ lb. sugar of lead (poison), and $\frac{1}{2}$ lb. powdered alum; dissolve them in a bucket of rain water, and pour off into another vessel; steep the tent material in this, allowing it to soak thoroughly.

If the quantity of liquid is not sufficient, increase in the same proportions. Hang the material up to dry, but do not wring it. This process is also suitable for waterproofing garments.

Burned-Out Lamp Makes Good Spark-Plug Tester

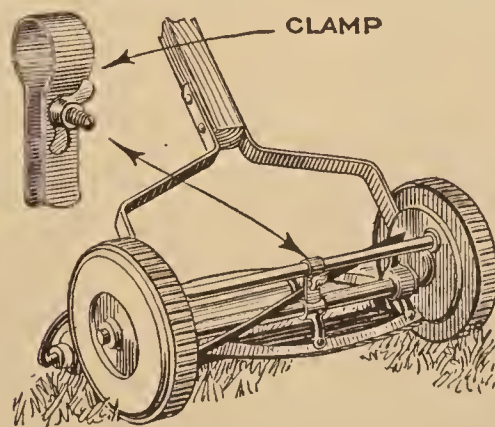
Every motorist needs a spark-plug tester at intervals; a hammer, screwdriver, or other metallic object, provided with a nonconducting handle, will answer, but more accurate results will be obtained if a tester is used in which the spark gap is brought out into full view.

A burned-out headlamp bulb will give excellent results and afford the maximum protection from an electric shock. A globe with single contact will serve best, as the connections are made more simply with this type. A piece of metal should be soldered to the base of the bulb and allowed to project parallel with it, so that it can be grounded against the shell of the plug. With the center contact of the bulb held against the top of the plug and the projection against the shell, a spark will easily jump across the gap formed by the broken wires in the partially exhausted bulb. This affords a large spark that can be readily seen, yet, owing to the vacuum, the resistance is not sufficient to affect the sensitiveness of the device.—S. E. Gibbs, Ames, Ia.

A Safety Device for the Lawn Mower

Children are natural-born investigators, and anything of a mechanical nature excites their curiosity, especially if they are warned not to touch it. For this reason many children get their fingers hurt more

or less seriously playing with lawn mowers, and, as it is not always convenient or possible to put the mower out of reach, the simple little attachment shown in the

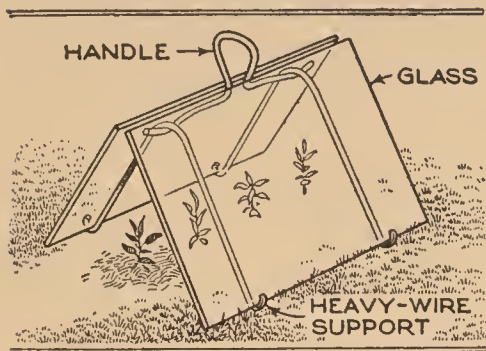


drawing will be appreciated by most parents.

A strip of flat iron is bent to form a clip and drilled for a bolt and wingnut. To lock the revolving blades, slip the clamp over the guard bar and one of the knives and then tighten the wingnut. In this position the mower can be inverted and the wheels will run, but the knives will not move. When the mower is in use, the clip is turned up or pushed to one side and the screw tightened to hold it in position while using the mower.

A Plant Forcer

In order to force the growth of seedling vegetable plants, some means of retaining the sun's heat must be used, and for this



purpose the device shown in the drawing will be found to give admirable results.

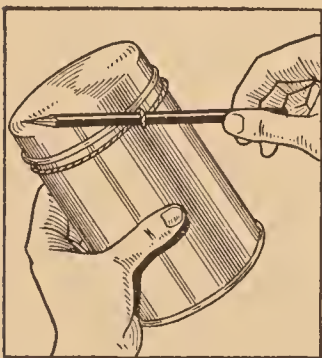
Two pieces of clear glass, which may be old photographic negatives that can be obtained for a cent or two each from

any photographer, are inclined toward each other at the top, the glass plates being supported by a wire form.

Three pieces of stiff wire are required for the form, and these are bent as shown in the drawing, the top piece serving to lock the glass in place and also as a handle by means of which the whole arrangement can be easily moved.—Frank W. Harth, Bayside, L. I.

Opening Tight Containers

All have experienced the annoyance caused by ineffectual attempts to remove tight-fitting tops of containers. A simple



trick, that will prevent many broken finger nails, or cut fingers, is shown in the illustration. Place a piece of strong string around the tin, just under the lid. Tie the ends, leaving about $\frac{1}{2}$ in. of space between string

and tin. Now insert a pencil, or other convenient instrument, under the string and twist as shown. The top can then be removed easily.—S. L. Bastin, Bourne-mouth, Eng.

Gas Saver for the Light Car

Owners of light automobiles can greatly increase their gasoline mileage by a simple contrivance that also permits considerably greater speed.

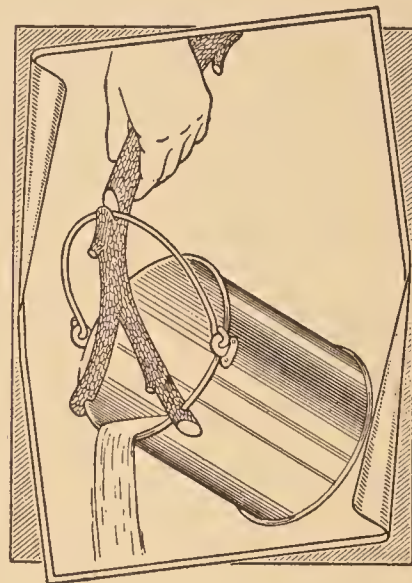
Drill and tap a $\frac{3}{16}$ -in. hole about the center of the intake manifold and screw in a small petcock, similar to those used on the crankcase. Next attach a rod to

the handle of the petcock, and run the rod up through the dash, so that the cock can be adjusted while the car is running.

When the engine is started, the cock is closed, and allowed to remain closed until the engine has become thoroughly warmed up, when it is opened, giving additional speed and permitting the amount of gasoline to be cut down.—Carl Siderlund, Jr., Youngstown, Ohio.

Handling Camp Kettles

Removing a kettle from the camp fire demands considerable care and caution, if burned fingers are to be avoided and the contents of the kettle prevented from spilling and possibly extinguishing the fire.

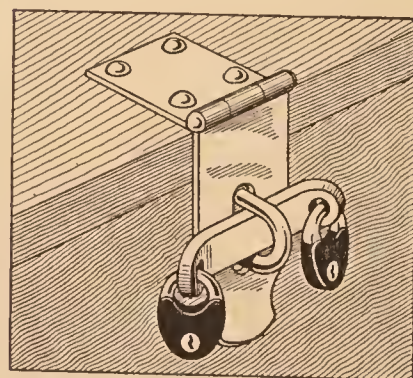


Fortunately, there is usually a forked stick of the right size to be found somewhere near, and this is converted into a safe handle by cutting three notches in it, as

indicated in the drawing, to prevent the handle and edge of the kettle from slipping. Using this handy little device, it is unnecessary to touch the handle until it is entirely cool, as the kettle can be removed from the fire and the contents poured out in the manner shown.—A. C. Cole, Chicago, Ill.

Lock Used by Two or More Persons

It often happens that several persons are to have access to a boat or locker pro-



ected by a padlock. If not enough keys for all are supplied with one lock, a simple way out of the difficulty, without the expense and trouble of having duplicate keys made, con-

sists in using two padlocks, as shown in the drawing. A strap-iron link is made, with a hole drilled in each end to accommodate the padlocks; this is passed through the staple or a link of the boat chain, and locked at each end.

Ebonizing Oak

A good process for ebonizing oak is as follows: The wood is immersed for about 48 hours in a warm saturated solution of alum, and then sprinkled several times with a solution of logwood. This is prepared by boiling one part logwood in 10 parts water, filtering it through linen, and evaporating the liquid slowly until the volume is reduced by one-half. Add to every quart of this solution from 10 to 15 drops of a saturated solution of neutral soluble indigo.

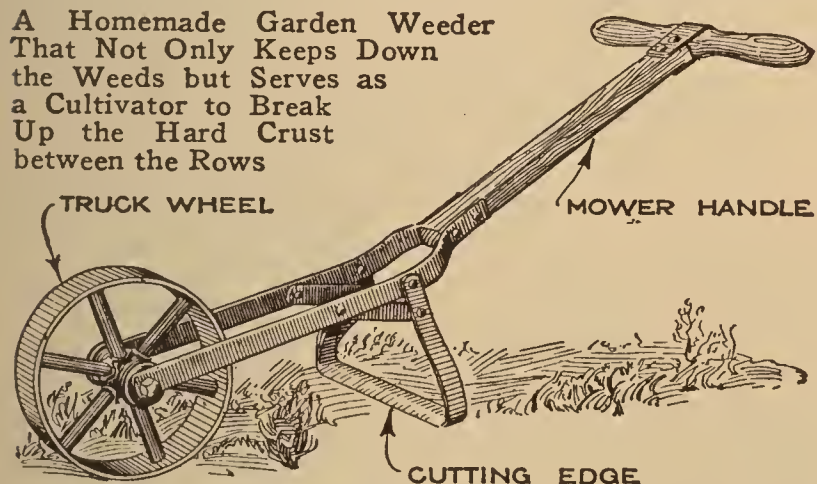
After watering the blocks with this solution several times, rub them with a saturated and filtered solution of verdigris in warm concentrated acetic acid, until the desired depth of color is obtained.

A Homemade Garden Weeder

From a few pieces of flat iron, such as old buggy tires, and a wheel that can be taken from an old wheelbarrow or truck, it is possible to make an efficient weeder for keeping the home garden free from weeds.

The device is constructed, as indicated by the drawing, with a blade, parallel with the ground, which is pushed along just underneath the surface, cutting the roots of weeds and other plants outside the

A Homemade Garden Weeder That Not Only Keeps Down the Weeds but Serves as a Cultivator to Break Up the Hard Crust between the Rows



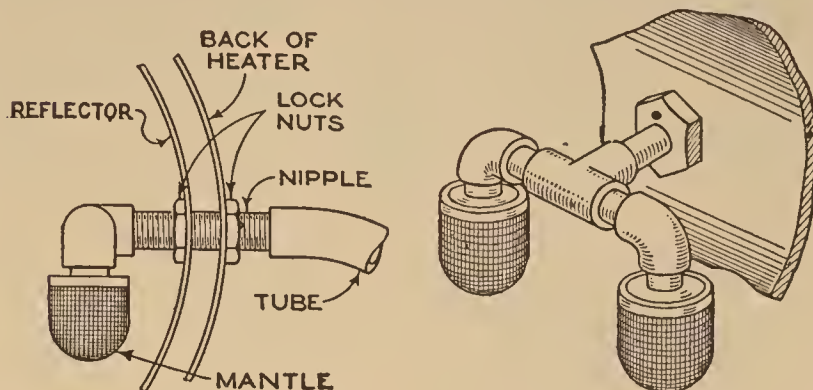
rows. Not only will this instrument keep down the weeds, but it also acts as a cultivator by breaking up the hard crust between the rows and conserving the moisture for useful vegetation.—C. L. Meller, Fargo, N. D.

Converting Electric Heater to Gas

To reduce the expense of operating an electric heater, such as have become quite popular for tempering the chill of an early spring morning, the heating element was removed and replaced with two gas burners.

A hole was first drilled through the reflector and the back of the heater, and a

short nipple secured in place with lock-nuts on each side, as shown in the drawing. A tee, equipped with two light fittings, was screwed on the front end of



An Electric Reflector Heater Converted to the Use of Gas Removes the Chill of an Early Spring Morning from a Room, and the Cost of Operating is Considerably Reduced

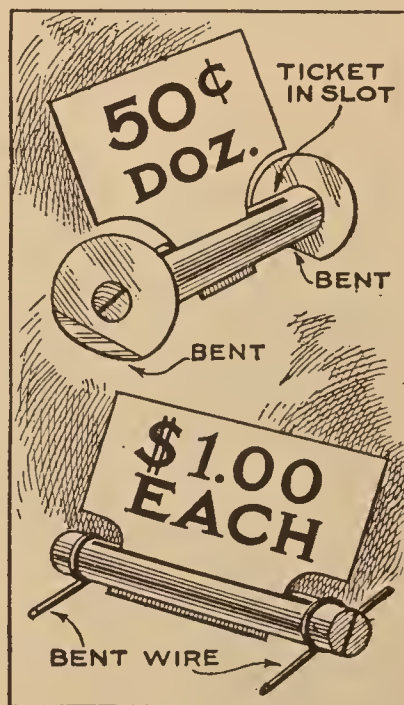
the nipple, and the tubing connected to the other end; the light fittings were provided with mantles, and the heater was ready for use.

While this arrangement did not produce results quite so good as the electric heating element, it proved satisfactory and the operating cost was considerably reduced, which, in this case, was the important feature.—C. M. Vail, San Francisco, California.

Ticket Holders Made from Film Spools

Empty film spools, such as any photographer will cheerfully give away, can be used for making price-card and ticket holders, such as shown in the drawing.

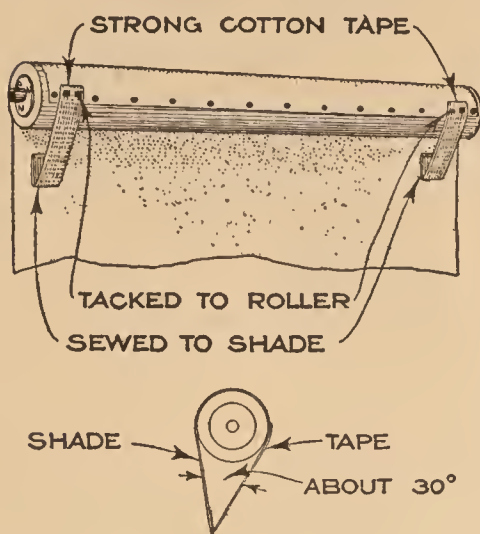
In the upper drawing, the ends of the spool are bent to form a flat surface and prevent rolling. Another method consists in removing the metal ends and wrapping a short piece of wire around each end of the core, which can be stained or finished as desired, the card being inserted through the slit provided for the film.—F. C. Davis, St. Joseph, Mo.



☛ A small brush, fitted to the end of the handle of the fly swatter, will be found useful for brushing off insects that stick after having been killed.

A Window-Shade Saving Device

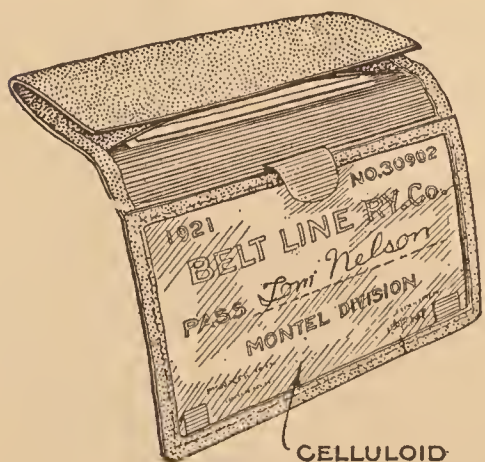
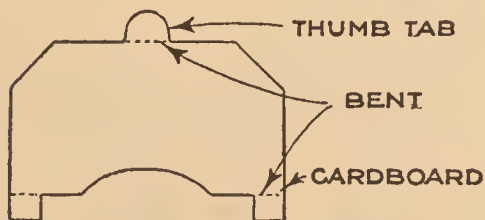
In large buildings a great deal of expense is caused by window blinds or shades being pulled from their rollers,



because there is no means of preventing them from being fully unwound. By attaching strips of strong cotton tape to the blinds and rollers, as shown in the drawing, the shade is prevented from being entirely unwound, and it requires a rather vicious yank to tear the tapes. The lower ends of the tapes are sewed to the shade and the upper ends are tacked to the rollers. On narrow shades, a tape at each edge will be sufficient, while several should be provided on very broad ones.—D. D. Gurnee, Hempstead, N. Y.

Protecting the Card Case

The transparent celluloid of the ordinary card case, containing identification cards and passes which must be frequently removed for examination of the

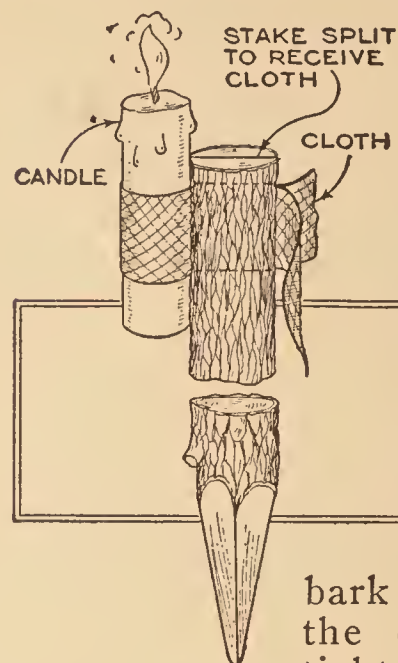


reverse side, usually becomes torn loose at the upper edge within a short time. This is caused by the necessity of inserting the thumb and forefinger to withdraw the card, thus stretching and bending the celluloid. The drawing shows a simple means by which the cards are easily removed and the celluloid protected against damage. A piece of thin, tough cardboard, the size of the card, is cut with a small tab at the top and two small projections at the bottom. It is a simple matter to slip any card into the case, but with the false back it is even easier to get it out. The small thumb tab

is bent over against the cover and is easy to grip with the fingers; the projections at the bottom are bent up and the card resting upon them is withdrawn when the tab is pulled.—Frank W. Bentley, Jr., Missouri Valley, Ia.

A Handy Camp Candlestick

The lack of a candlestick, or other means for holding the candles commonly



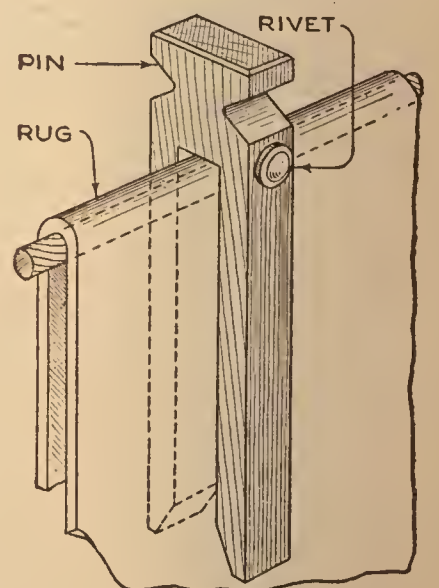
used to furnish the illumination in many camps, need cause no serious annoyance, as a suitable holder can easily be made from a strip of cloth, or bark, and a stake of suitable length.

The upper end of the stake is split, and the ends of the cloth or bark strip are inserted in the cleft and pulled up tight around the candle, as shown in the drawing. The lower end of the stake is sharpened, so that it can be pushed or driven into the ground at any convenient location.

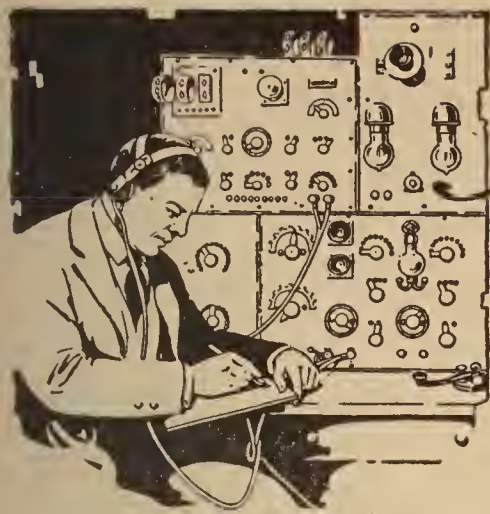
Rug and Carpet Clothespins

Anyone who has undertaken to fasten a rug or carpet to a clothesline knows that the ordinary clothespin is neither

large enough nor strong enough for the purpose, the first blow of the beater usually serving to cause all the pins that can be squeezed on without splitting to fly off. The drawing shows a pin built for the special purpose of fastening the floor coverings to the line.



A piece of $\frac{5}{8}$ -in. hardwood, about 6 in. long and $1\frac{1}{4}$ in. wide, has a slot, about $\frac{3}{8}$ in. wide, cut down the center. To prevent the pin from splitting, a long rivet is inserted through a drilled hole just under the head, and riveted over a washer.



A SPACE-SAVING RECEIVING TUNER

By F.L. Brittin

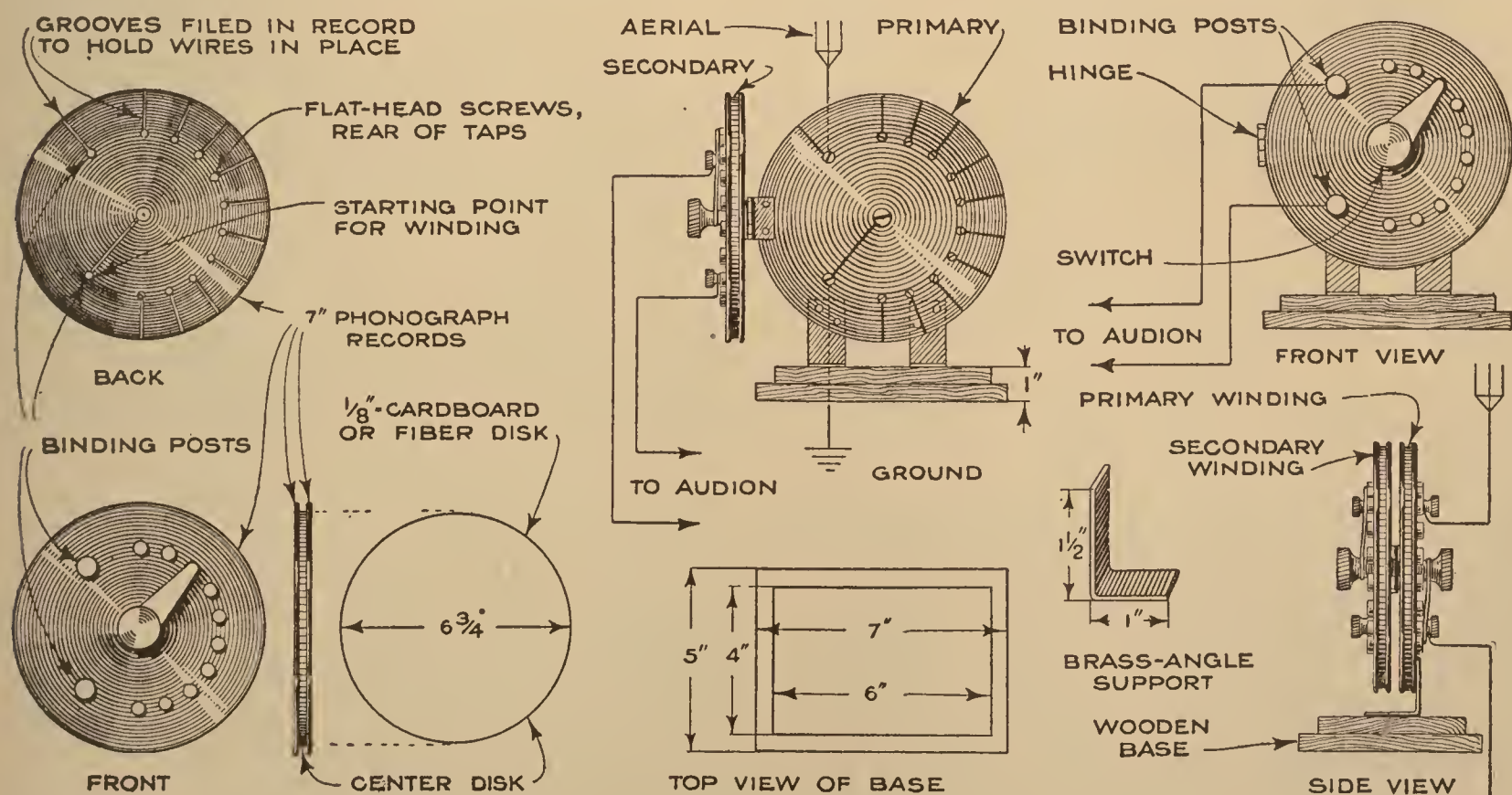
THE type of radio-receiving tuner described in this article occupies less space than other designs of like capacity, is easy to make and simple to operate, works well on loop aerials and has proved highly efficient when used in connection with the vacuum-tube Marconi bulb.

The coupling between the primary and secondary windings is adjusted by pulling the secondary out at right angles; this does not involve the telescoping of primary and secondary as found in the variometer, but the result is the same.

Such an inexpensive and compact tuner lends itself admirably to portable sets, where simplicity and compactness are highly desirable. The primary and secondary disks are both identical, with the exception that four extra holes are drilled in the primary disk for the brass angle supports. The disks, which are made of 7-in. phonograph records and cardboard, are easy to construct, but care must be used in drilling to avoid cracking. Two records are required for the primary disk, and two for the secondary. The center disks are cut from fiber, or heavy card-

board, and well shellacked. Next, glue the records to the center disks and clamp through the center to hold them in position until dry. After the glue has dried, the disks are drilled, notched, and grooved. The central holes for the switch levers will be $\frac{1}{4}$ in. in diameter, and are already provided in the records. The holes for the binding posts and taps are drilled to correspond with the material the builder has on hand. Mount all taps, binding posts, and switch levers complete, and wind the primary with 110 turns of No. 28 double silk-covered magnet wire, starting at the point indicated in the drawing and bringing out taps every 11 turns. When each tap is reached, loop the wire; twist, and bring it over the notch in the edge of the disk to the tap, where the insulation is removed and the wire soldered to the back of the tap, taking care not to melt the disk while soldering.

The secondary disk is wound with 210 turns of No. 32 double silk-covered magnet wire, with the taps brought out every 21 turns, starting and completing the disk as described for the primary. The switch



A Simple and Easily Constructed Receiving Tuner That will Take Up Very Little Space on the Operator's Table: The Materials Used Are Easy to Obtain, the Winding and Assembly Are Very Simple, and the Tuner will be Found to Operate Well on a Loop-Aerial Circuit

levers on both primary and secondary disks are connected to the binding posts, as indicated in the various drawings.

After all connections have been soldered, file off all long screw ends, and cover with bookbinder's cloth. The small brass hinge used to connect the two disks can be obtained at any hardware store, as well as the two small brass angles which support the primary on the base. Phonograph needles may be driven into small holes beside the first and last contact points as stops for the switch lever. The

switch-lever blade is made of No. 28 gauge spring brass, the knobs, contact points, etc., being obtained at any supply house.

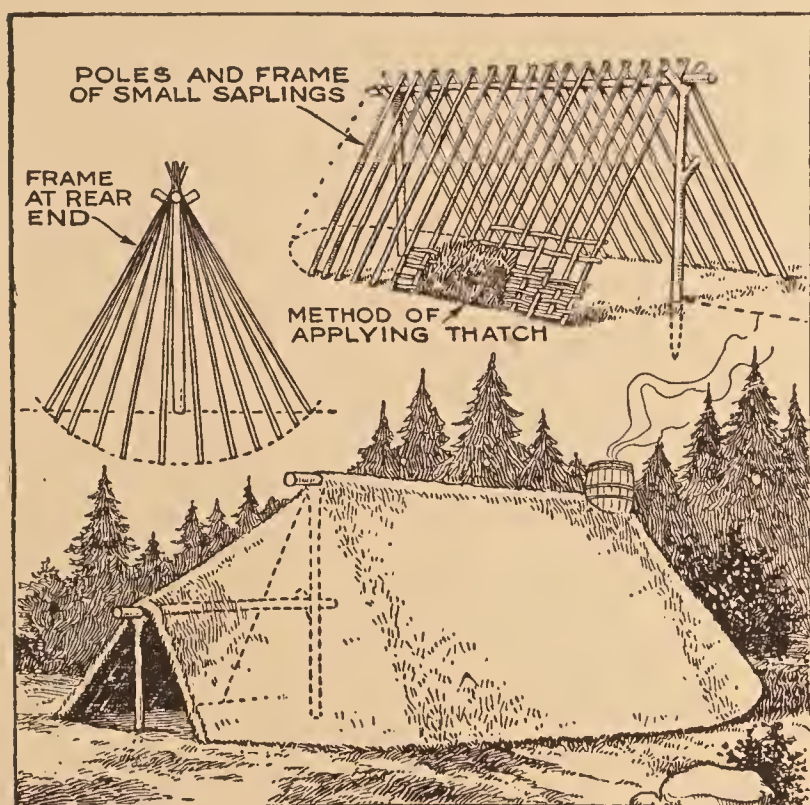
The base may be made of well-sanded oak, walnut, maple, or other hardwood, stained and finished as desired.

MATERIAL LIST

4	binding posts	1	small brass hinge
2	switch levers complete	2	brass angles
20	contact points	2	pieces hardwood (base)
4	7-in. phonograph records	200	ft. No. 28 d.s.-c. magnet wire
2	cardboard or fiber disks	400	ft. No. 32 d.s.-c. magnet wire

A Cave House of Boughs and Thatch

There is a singular romance attaching to cave dwellers, or troglodytes, that never ceases to fascinate a boy, possibly



There Is a Singular Fascination to Boys in Living in Caves, but It Is Dangerous. This Cave House can be Built Anywhere and Is a Perfectly Safe "Robbers' Den"

for the reason that pirates, and other characters of his favorite fiction, hold forth and store their booty in caves. Cave houses are dangerous, as the earth is likely to cave in on the workers, but the house described in this article offers an acceptable substitute.

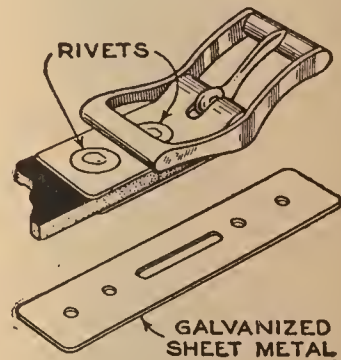
Two forked sticks are securely set into the ground, and a ridgepole is laid across the forks, as shown. The sides are formed by placing a number of small poles, or saplings, at an angle to the ridgepole. Additional strength is obtained by burying the bottom ends of the poles in the ground. A number of poles are arranged in a semicircle at the rear of the frame, the poles resting in the crotch of the rear upright and ridgepole. The house is com-

pleted by covering it with boughs, thatch, bark, or sod. If thatch is used, it is necessary to have some poles nailed or tied horizontally to the frame, or smaller boughs may be woven between the side poles, basket-fashion. Begin applying the thatch at the bottom and work toward the top. When the bottom row of thatch has been applied, another row is put on so that the rows overlap, until the top is reached. A hole is left at one end in the roof, to permit escape of smoke from the fire which is built directly underneath. If the front upright has a crotch about the center, a small extension may be added to the house, built in the same manner as the house itself, so that the young "pirates" and "smugglers" will have to crawl into their dwelling after the approved fashion.—J. G. Allshouse, Avonmore, Pa.

Attaching Buckle to Broken Strap

When repairing harness, leather straps are often found to be badly worn where they are looped through buckles. To turn a fresh loop shortens the strap, and to rivet another length of leather to the end, makes a bulky, unserviceable repair.

A much neater method is to cut a piece of galvanized iron to the shape shown in the drawing, slip the tongue of the buckle through the slot, bend the iron over the end of the strap, and rivet. The galvanized iron will not wear out as quickly as the leather, and it will not rust from the sweat of the horse.—Geo. McVicker, North Bend, Neb.



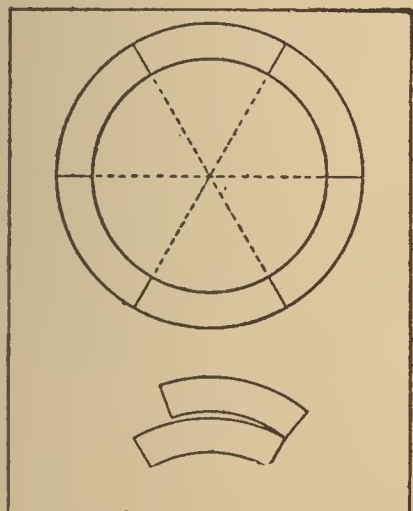
Small rubber rollers can be made by drawing rubber strips through a hole in a heated piece of metal.

The Care of Tire Chains

The statement that more tire chains rust out than are worn out contains more than a grain of truth. To prevent the chains from rusting they should be oiled. Fresh oil is not required; that which is drawn from the engine at intervals will answer very well. Have a can of this old oil where the chains can be dipped conveniently, and, after dipping, hang them on a nail overnight to drain off the surplus. This treatment leaves the chains ready to be wrapped in a cloth and placed in the tool box, and is, perhaps, best appreciated when it comes to applying them to the tires, as the hooks will not require the usual amount of twisting and hammering to fasten them.

A Simple Geometrical Trick

A simple geometrical trick that can be made from a piece of cardboard will provide plenty of entertainment at the efforts



of others to prove that two identical circular-ring sectors are of different sizes.

Two concentric circles are drawn on the cardboard with a compass, and these are carefully divided into six equal parts, and two ring sectors are cut out.

Then place the sectors one above the other as below, and ask someone how much longer one piece is than the other. Unless the person has seen the experiment before, he will invariably say that one is considerably longer than the other. Now reverse the pieces and repeat the question. The fact that the two pieces are the same size can be established to the satisfaction of anyone by placing one on top of the other.—Norman Hazen, Montreal, Que.

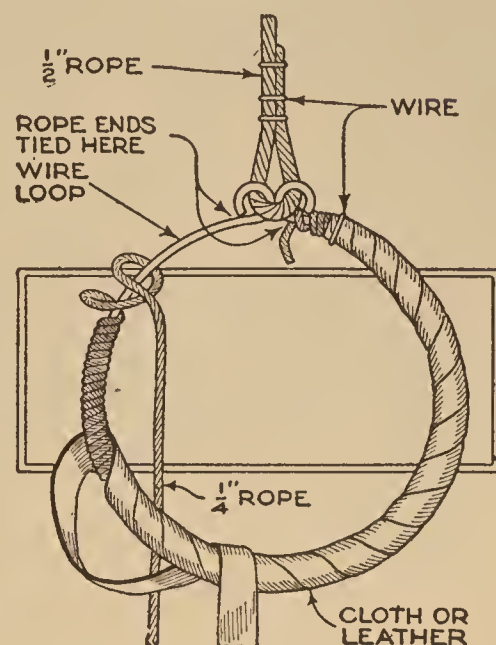
Stopping Leaks in Wooden Tanks

It is often difficult to drain wooden tanks to repair leaks. One method of stopping a leak is to put some oatmeal in a paper bag, then tie this on a stick and push it down against the leak. With another stick, rip the bag slightly, and enough oatmeal will be drawn into the leak to stop it.

Cheap Gymnasium Rings

An inexpensive pair of gymnasium rings can be made from heavy wire, iron rod, or even the heavy bails, or handles, of some types of buckets, if they are not required to carry too much of a load.

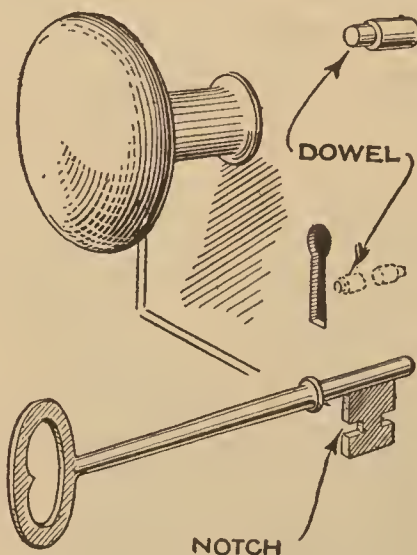
The ends of the wire or rod are bent into eyes, and after the ring has been formed, it is wound with



rope to make a comfortable grip for the hands. The rope may be covered with a strip of strong cloth, or an even better effect obtained with a strip of leather. The rings are suspended from a suitable rope passed through the eyes and secured as shown in the drawing.—C. Alvarado Frouard, San José, Costa Rica.

Making a Lock More Secure

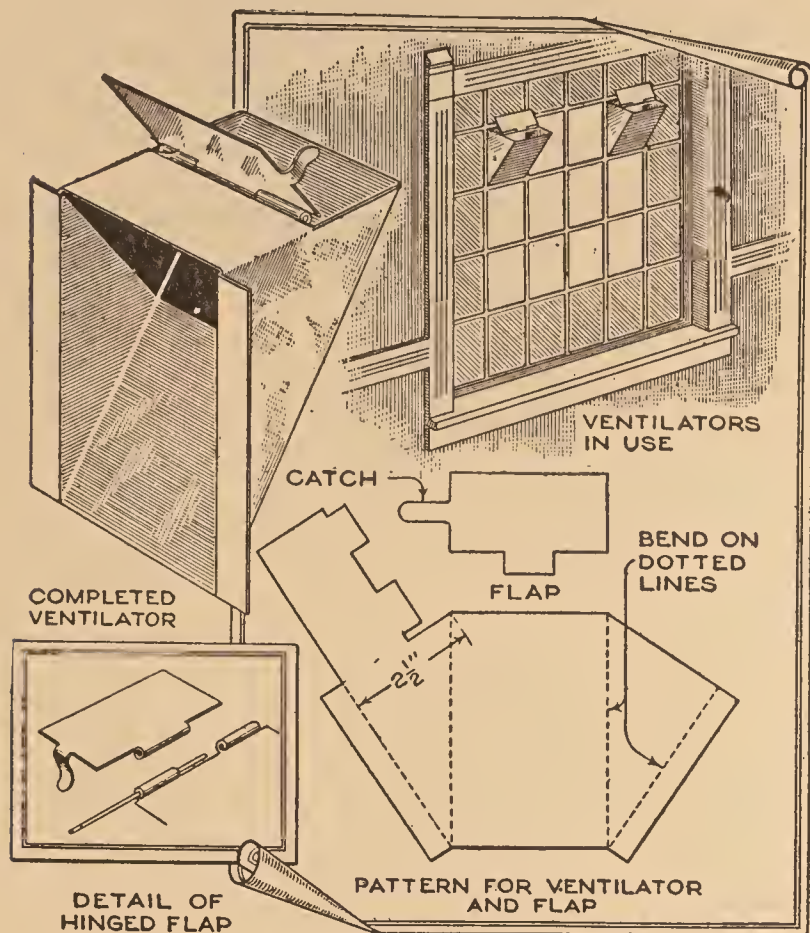
There are many varieties of cheap door locks that can be opened with almost any kind of a key, but these can be arranged so that none but the proper key can even be turned in the lock. This method consists in removing the lock plate and drilling a small hole at one side of the key opening, and then riveting a small metal dowel pin in place; the dowel will prevent any key but the right one from being turned in the lock.



In order to make the key fit the lock that has thus been altered, an additional notch must be filed in the key to pass over the pin, the notch being filed on both sides of the key so that it can be inserted and turned from either side of the door to lock or unlock it. If desired, the lock can be arranged to be unlocked from only one side by filing the notch on one side of the key only, and also two dowels may be used.

Ventilators for Small-Light Windows

Windows with many small lights are quite frequently mounted so that it is impossible to raise or swing them open to afford ventilation, and it is for windows



A Light and Inconspicuous Ventilator for Windows Fitted with Small Lights Which cannot be Opened for Ventilation

of this type that the ventilator shown in the drawing is designed.

The ventilators are made of galvanized sheet steel, in accordance with the pattern shown, the sides being bent as shown by the dotted lines. The height of the sides should be exactly the same as that of the glass the ventilator is to be substituted for, and the sides, for neatness' sake, should not be more than $2\frac{1}{2}$ in. long, as indicated in the pattern, although the length of the sides is shown, in the illustration, a little exaggerated for the sake of clearness.

If the ventilators are to be applied to leaded-glass windows, they may be attached permanently by soldering to the lead strips, care being taken to prevent cracking the glass; while in windows with wooden frames, they are puttied in place in exactly the same manner as the glass. A small catch, formed on the flap, and bent to bear against the side of the ventilator, while not absolutely essential, will prevent the flap from chattering in strong winds.

■ Melted sealing wax over the connections of a radio aerial switch will prevent corrosion and leakage over the base in wet weather.

Frosting Glass

To frost glass, rub it with a piece of marble, using emery powder as the abrading agent. Coarse powder should be used first, following with finer as the surface becomes finished.

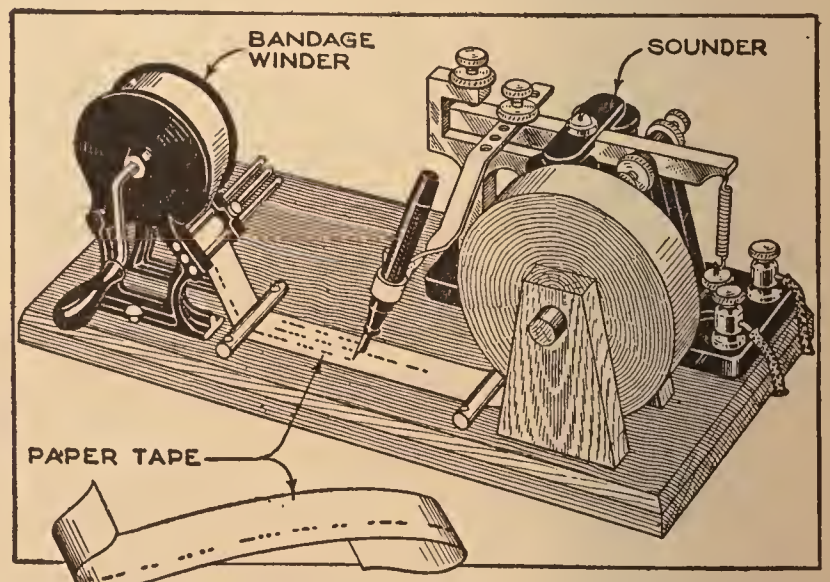
For temporary frosted effects, the simplest method consists in dabbing on the glass a mixture composed of a saturated solution of Epsom salts, to which a little gum arabic has been added. The solution should be applied warm, and, if the glass is to be handled much, it should be given a coating of gum water.

A Printing Telegraph Instrument

As every amateur telegrapher knows, it is much easier to send messages than it is to receive them from another station. To provide a means for printing the messages on paper tape, almost any type of sounder can be converted into an improvised printing telegraph instrument without alteration.

The armature setscrew is removed and, in the original instrument, a strip from a "model builder" set is inserted underneath it. The metal strip is bent into the shape shown, with a clip at the outer end, through which a fountain pen is inserted and tightly fastened with a small wooden wedge. The paper tape, which is the kind used on most types of adding machines, passes under the strips to the winding apparatus, made of a bandage roller.

The pen is adjusted so that, when the armature is drawn down by the magnets, the pen will come into contact with the moving paper, making a short line for a



An Ordinary Telegraph Sounder can be Easily Converted into a Simple Printing Telegraph Instrument without Altering the Sounder

dot and a proportionately longer one for a dash, the winder being turned so that the tape passes under the pen at a constant speed.—W. G. Dewar, Ottawa, Ont.

Handles for Safety-Razor Blades

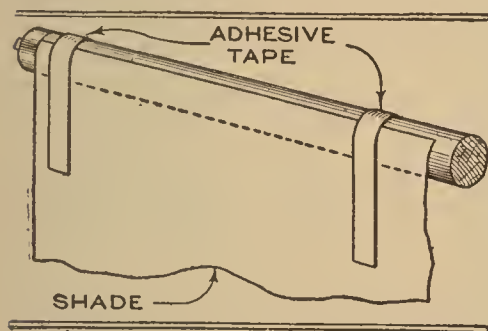
Finding that most of the women of my acquaintance used safety-razor blades for ripping seams, and one purpose or another, and that they experienced some difficulty in holding them, I fitted the blades to old toothbrush handles, making them much easier to use and removing the danger of cut fingers from double-edged blades.

Of course any kind of material can be used for handles; aluminum, hard fiber, and even hardwood, when provided with a suitable slot. However, an old toothbrush furnishes a handle that is ready-made. The bristles are removed and a slot is cut into that end to take the blade, which is held in place by rivets made from soft solder, inserted through holes drilled through the handle. Although the solder rivets would seem soft, they serve to hold the places securely, and are easily removed. When completed, both sides of the handle are finished smooth.—M. L. Lowrey, Livermore, Calif.

Attaching Shades to Rollers

Being called upon to repair a window shade that had pulled loose from its roller, and having none of the small tacks used

for the purpose at hand, strips of adhesive plaster were used with satisfactory results. The plaster was cut into 6-in. strips,



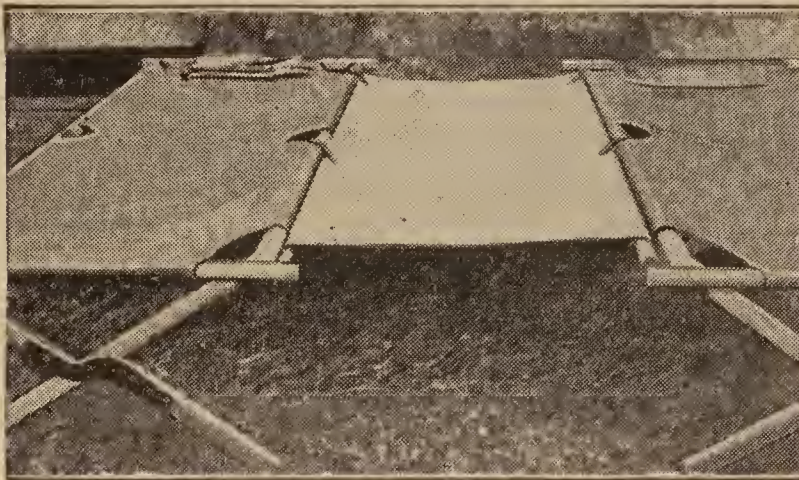
one-half of this length being wrapped around the roller and the rest attached to the shade.—Thos. W. Benson, Philadelphia, Pa.

Three Cots Made from Two

Two folding army cots are about all the average automobile tourist or camper wants to carry along with him, but if there are three members in the party, some sleeping arrangements must be provided for the "crowd."

The photograph shows how a party of three automobile tourists slept on two cots. Two sticks, the length of the cots when opened, were inserted through hems sewed into the sides of a strip of canvas, to form a bed for the third person. This arrangement was slung between the two cots by means of straps, one end of

which was fastened to the sticks, the free ends being passed around the side rails of the cots and buttoned on fasteners such as used for fastening buggy curtains.



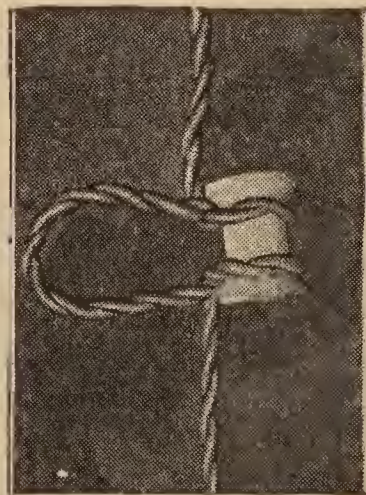
Reducing the Bulk and Weight of the Camper's Equipment by Taking Only Two Folding Cots for Three Persons: The Third Sleeps on a Canvas Strip Slung between the Two Cots

Shorter sticks, notched at the ends, were inserted between the side sticks at the head and foot, below the canvas, to keep it stretched tight. The only objection to such a bed is that the person occupying the central part must wait until the other two members of the party have retired. Also, should one of the "outsiders" get up during the night or roll out of bed the man in the center will be dropped down unless both cots are prevented from tipping over by driving a stake at each end and fastening the outside corners down with a short length of rope.—Harry E. Forbes, Van Wert, Ohio.

Cord Adjuster Made from Spool

Electric lamps, depending from the ceiling on a flexible cord, can be adjusted for height by using an empty spool instead of tying a series of knots in the cord as is usually done, at the risk of damage to the insulation of the wire, in addition to their being hard to untie.

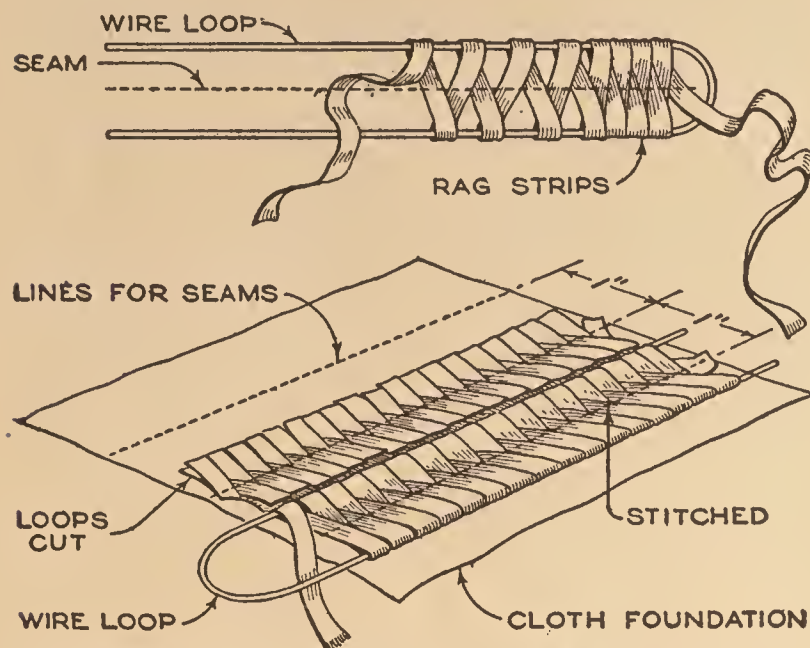
In use, the wire is looped over each end of the spool in the manner indicated in the photograph, with the excess length forming a loop in the center.



❏Sickle sections of a mowing machine can be easily removed by clamping them in a vise and striking the end of the bar with a hammer to shear off the rivets instead of filing.

New Method for Making Rag Rugs

A beautiful rug, similar in appearance to the old-fashioned drawn rugs, but demanding far less work, can easily be made at home.



A Simple Method of Making Rag Rugs. The Rags are Torn Into Strips, Looped, and Sewed to the Cloth Foundation

The only tools needed are a sewing machine and a long wire loop bent into the shape of a hairpin. The loop can be made from a piece of stiff wire, bent so that the sides will be an inch or so apart, this distance depending upon the appearance desired in the completed rug. A piece of strong denim, burlap, ticking, or similar material, is also needed for the foundation of the rug; if ticking is used, have the strips run crosswise, and if the foundation has no strips, it will need to be marked with parallel lines, about 1 in. apart, with a heavy pencil.

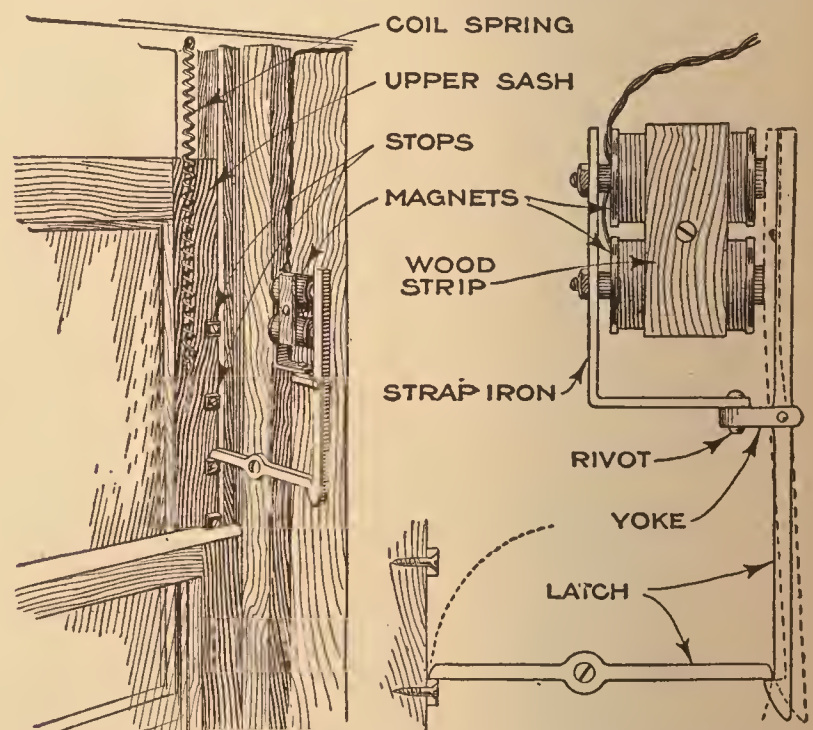
The rags used are torn into strips, as for carpet rags, although somewhat narrower, and they need not be sewed together. Take one of the rag strips and, fastening it to the rounded end of the wire loop with a safety pin, weave the strip around the wire, as shown in the drawing, so that the separate loops will be as close together as possible. Then take the foundation that has already been prepared, place the pin on the middle line, and sew the strip on in the sewing machine, running the seam through the middle, as shown by the dotted line in the drawing. When the strip has been sewed, the loop is drawn out and the result is a double row of cloth loops across the middle of the rug. This operation is repeated, first on one side and then on the other of the center row until the rug is completed. If one pinful of the woven strips does not reach all the way across, stop at the end, withdraw the wire, refill and finish the row.

After the rug has been entirely covered, the rows of loops are cut open with the shears. After a hard shaking the rug will have all the appearance of the tediously hand-drawn article.—Cora Hamilton, Binghamton, N. Y.

An Automatic Window Closer

In the early hours of the morning when the temperature is around zero, it requires courage to climb out of a warm bed and close the bedroom window. However, by installing the electrically operated device shown in the drawing, the window will close itself.

The window is closed by a spring of the screen-door type, and is held open by a simple latch which engages with stops fastened to the upper sash. A groove must be cut in the lower sash to permit the stops to clear it. The latch is released by an electromagnet, connected as shown and operated by one or two dry cells. The device is wired to an ordinary alarm clock, or to the automatic regulator with which many furnaces are equipped, so that at the hour set, the circuit will be closed, releasing the latch, and permitting the window to be drawn up. Three or more



An Electromagnetic Arrangement for Closing the Bedroom Window can be Connected to an Ordinary Alarm Clock or Used in Conjunction with an Automatic Furnace Regulator

stops may be used so that the window may be only partly or fully opened. If the presence of the spring should be undesirable, extra-heavy sash weights can be used.

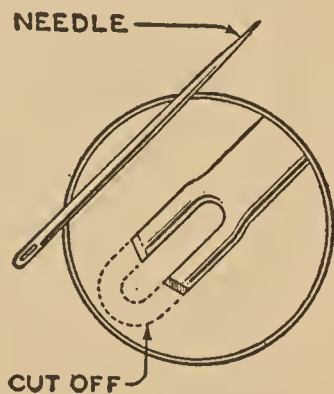
☞ Children's worn stockings can be made into socks by cutting off the tops, forming a 2-in. cuff, and embroidering it.

Mounting Photos on Canvas

Mounting photographic prints or enlargements on canvas or linen to give the effect of a painting, particularly when the work is to be colored, is often attended with unsatisfactory results. The proper method of procedure is as follows: The print is placed on some smooth surface, face down, and given a coat of any good photo paste, or even common starch paste, which must, however, be free from lumps. The paste is well rubbed in until the print, which preferably should be made on single-weight paper, is quite limp. Then the fabric is lowered upon the paste-covered print and rubbed into close contact. Special attention should be given to the edges so that they adhere properly, and for this purpose it will probably be found necessary to rub with a paper knife or similar article. After the print has been pasted to the cloth backing, it is turned face up and allowed to dry.

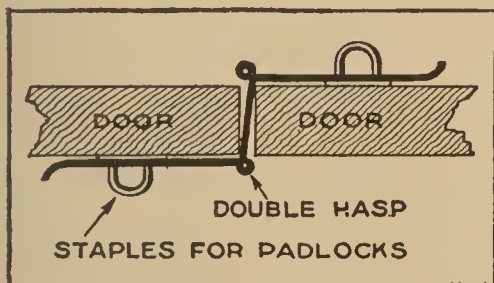
Drills Made from Needles

Small drills for a variety of purposes in the amateur's workroom can be easily made from ordinary sewing needles of different sizes. A portion of the eye is ground off and the sides are beveled as indicated in the drawing to form the lips. Such drills will prove very convenient for drilling holes of small diameter in various thin materials that are no thicker than the depth of the slot.—Edwin M. Love, Alhambra, Calif.



Double Hasp for Sliding Door

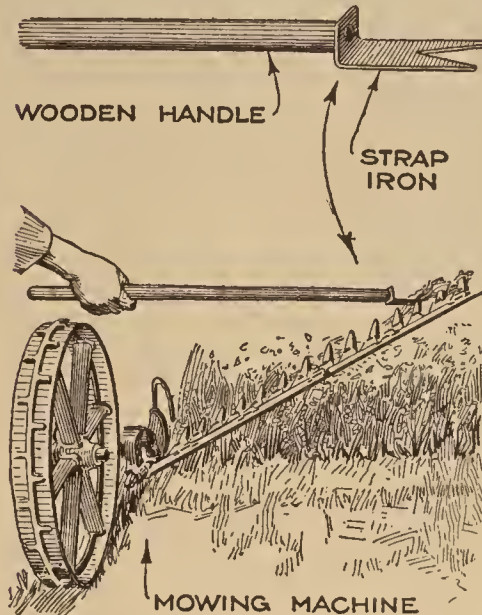
By using a double-jointed hasp, such as shown in the drawing, on double sliding doors, and two padlocks, the door can be unlocked from either inside or outside.



Two ordinary door hasps are used, the butt ends of which are cut off to the proper length and then welded or riveted together as may be most convenient.—E. E. Lakso, Toledo, Ohio.

A Sickle-Guard Cleaner

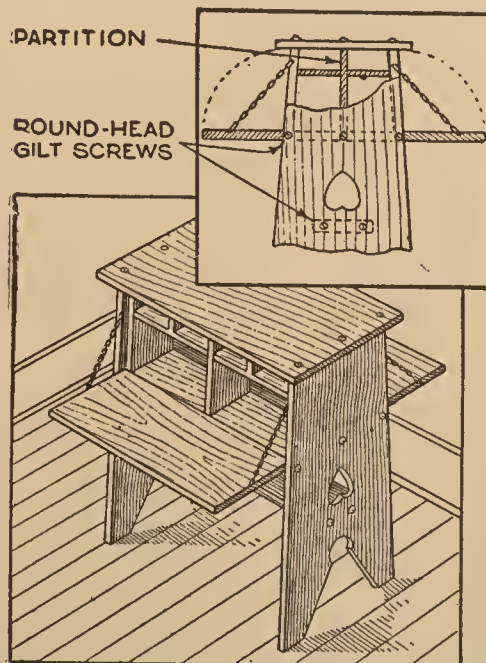
When mowing sweet clover, or other fine-stemmed hay, much trouble is generally experienced from dry trash or clover leaves sticking on the points of the guards and preventing them from entering the swath, thus leaving a strip of unmown grass.



When the sickle guards become thus clogged, it is usually necessary to back up the team, lift the bar and clean out the trash. To save time spent in dismounting from the machine, and also to protect the fingers against dangerous cuts, the simple cleaner shown in the drawing may be made from a piece of sheet metal screwed to the end of an old rake handle. By lifting the cutter bar with the foot, the cleaner can be used from the seat to push the trash from the points of the guards.—Geo. G. McVicker, North Bend, Nebraska.

A Double Desk for the Children

Having two boys attending school, and both wanting a desk in which to keep their work and stationery, the double desk shown in the drawing was designed and built, to avoid the necessity of buying or building two separate desks.



The desk shown is divided in the center by a horizontal partition, and a hinged writing leaf, which also serves as a cover, is provided for each half. Oak lumber was used, and after the work was finished, the desk was stained to harmonize with the rest of the furniture in the room.—A. C. Westby, Porter, Minn.

Metal Letters for Wire Screens

The heavy wire screens commonly placed over windows on shops, garages,

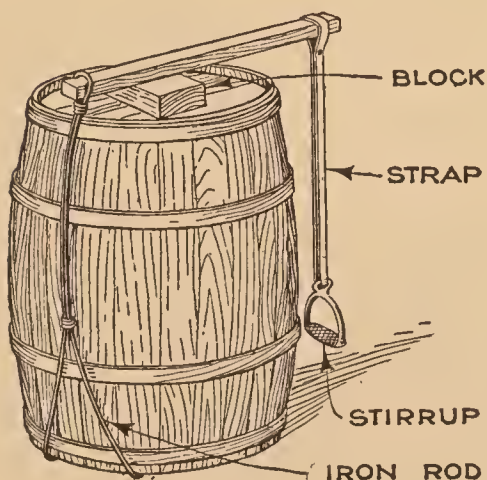


etc., as a protection against stones and the entrance of thieves, can be used to advantage for advertising purposes by attaching suitable sheet-metal letters and characters to the mesh.

The letters can be cut from any kind of sheet metal to the size and form desired, the only tools needed being a pair of tin snips, a cold chisel, and a file for finishing off any rough edges. Ears or tabs of suitable length are cut so that they can be slipped over the mesh and bent back to hold the letters in place. Such a sign is clearly legible in the daytime, but is even more conspicuous at night, when the window behind it is illuminated.

A Barrel Header

Barrels that contain apples, or other perishable or fragile articles, require that the packing be compressed firmly, so that the packed container may stand rough treatment in shipment with the least possibility of damage to its contents.

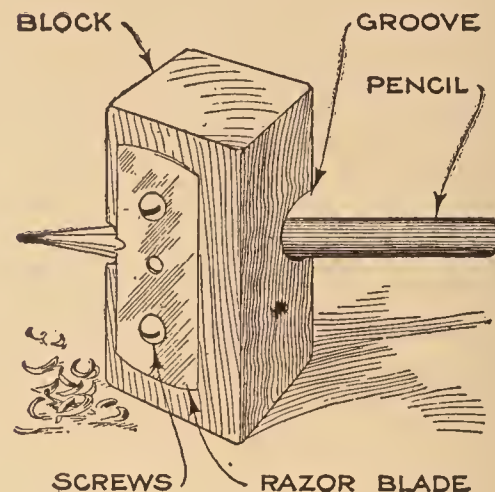


A useful contrivance, by means of which one man can press the heads of barrels into place, leaving both hands free for other operations, is shown in the drawing. It consists of a piece of $\frac{3}{8}$ -in. iron rod, bent into the form shown and provided with hooks at the ends to fit under the lower chine. One end of a short wooden lever is inserted in the eye, and a block is placed on the head of the barrel. The proper downward pressure is obtained by means of a

strap slipped over the outer end of the lever, the pressure being applied by inserting the foot into the stirrup at the lower end of the strap, and bearing down, when the head may be nailed.

A Simple Pencil Sharpener

Another of the varied uses to which safety-razor blades may be applied is in the construction of a simple pencil sharpener. A block of wood, about $\frac{3}{4}$ by $1\frac{1}{4}$



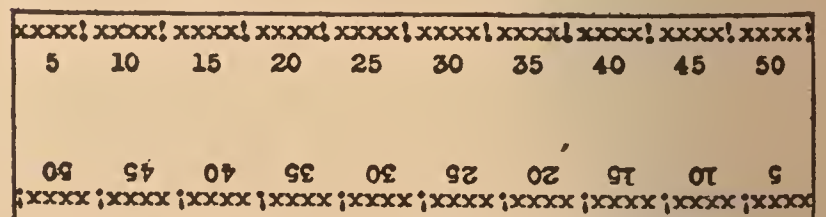
by $1\frac{1}{2}$ in. and two small screws, together with the blade, are the only materials needed, and a pocket-knife or round file, and a screwdriver, the only tools. A round-bottom groove is

cut or filed diagonally across the block; this is cut so that when the blade is mounted, as shown in the illustration, the edge of the blade will project over the edge of the groove about $\frac{1}{8}$ in. When the pencil is placed in the groove and drawn across the cutting edge, a small shaving will be cut from the wood, the pencil being revolved between cuts. The slope of the groove will give the proper angle to the pencil point.—Geo. G. McVicker, North Bend, Neb.

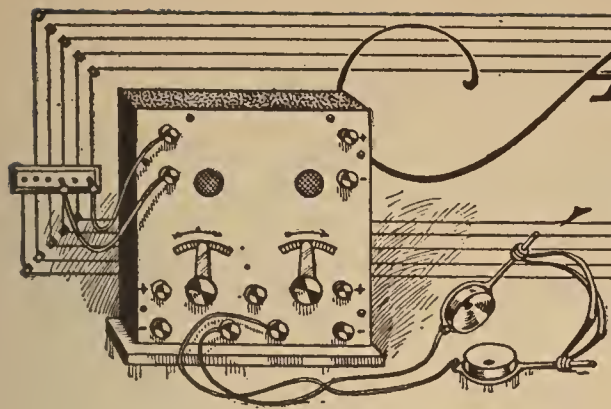
Spacing Rule for the Typewriter

For spacing odd lines of typewritten matter so that they will "balance" and give a neat appearance, the spacing rule shown in the drawing will be found almost indispensable.

The rule is typed on stiff paper, each fifth space being indicated by an exclamation point or some other distinguishing character. For additional convenience, the rule should be printed on both edges and on both sides so that it will be ready for use no matter how it may be picked up.—Harold R. Harvey, Claremont, Calif.



A Spacing Rule for the Typist That Makes It Possible to "Balance" Odd Lines of Poetry and Other Typewritten Matter



A CONCEALED LOOP AERIAL

By F.L. Brittin

N E A R L Y all designs of loop aerals now in use demand a considerable amount of space, and this is usually at a premium in the average amateur's radio laboratory.

The loop illustrated in the drawing, although slightly directional in its performance, will be appreciated by those who need the extra room and are not "finicky" about directional values. It is of particular value to the jeweler who receives his time by wireless and does not wish to mar the interior of his store with unsightly equipment, or to the amateur living in a small apartment.

Select a 6-ft. wall space, and wind the loop as in the drawing, using five or more turns of wire, which may be common bell wire, fastening it at the corners with insulated staples, and spacing the loops $\frac{1}{2}$ in. apart.

The brass plate is of the switchboard plug-and-socket type, obtainable from electrical-supply houses, a socket being provided for each loop of the aerial. Push-button of the flush-plate, wall-type

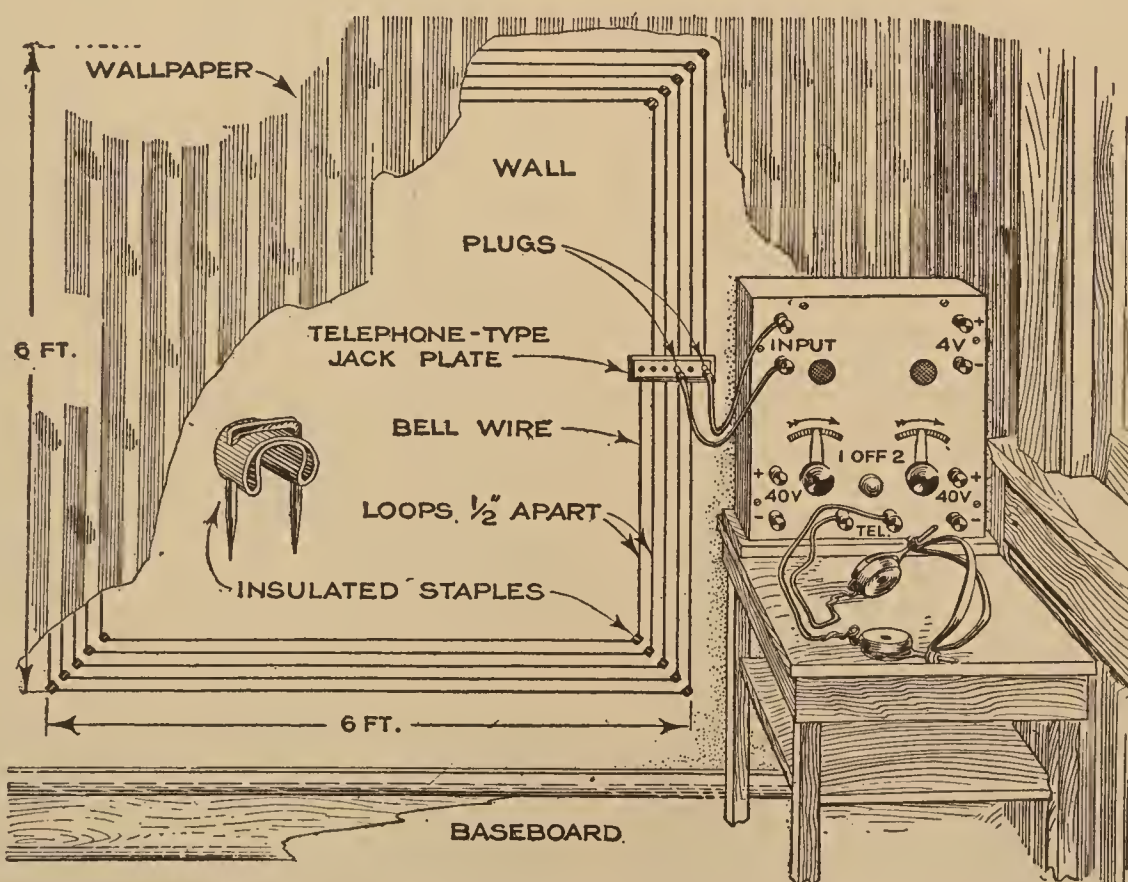
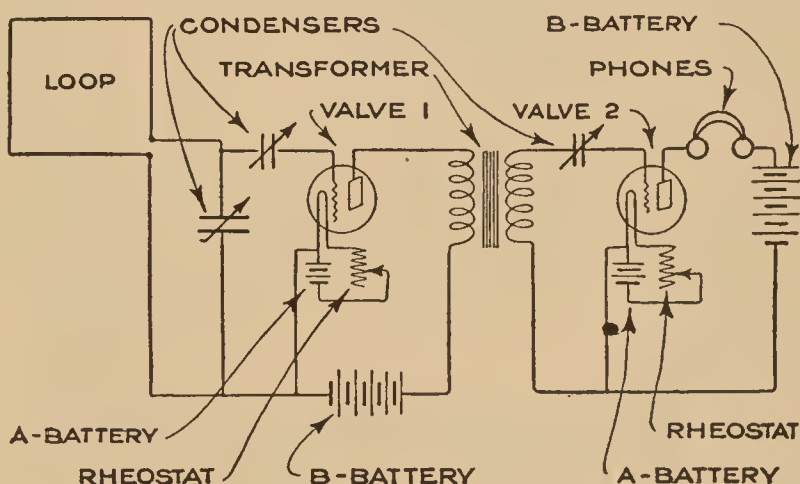
or snap switches may be placed above or below the plate for the purpose of cutting out dead ends. The wires may be concealed by mounting a wallboard panel over them, about $\frac{1}{2}$ in. from the wall, and covering the panel with wallpaper of the same

design as on the wall. At a distance of a few feet, the panel will be practically unnoticeable. If this is done, the plug plate

must be mounted on the front of the panel; the wires may, if desired, be mounted on the back, thus making the loop readily portable; this method is, indeed, preferable.

The following table is given as a guide to those who wish to know the number of turns necessary to receive a definite wave length, using a 6-ft. loop:

Wave Length, Meters	Turns
200 to 250.....	2
400 to 600.....	4
600 to 800.....	7
800 to 1,000.....	10
1,600 to 2,000.....	20
2,000 to 3,000.....	30



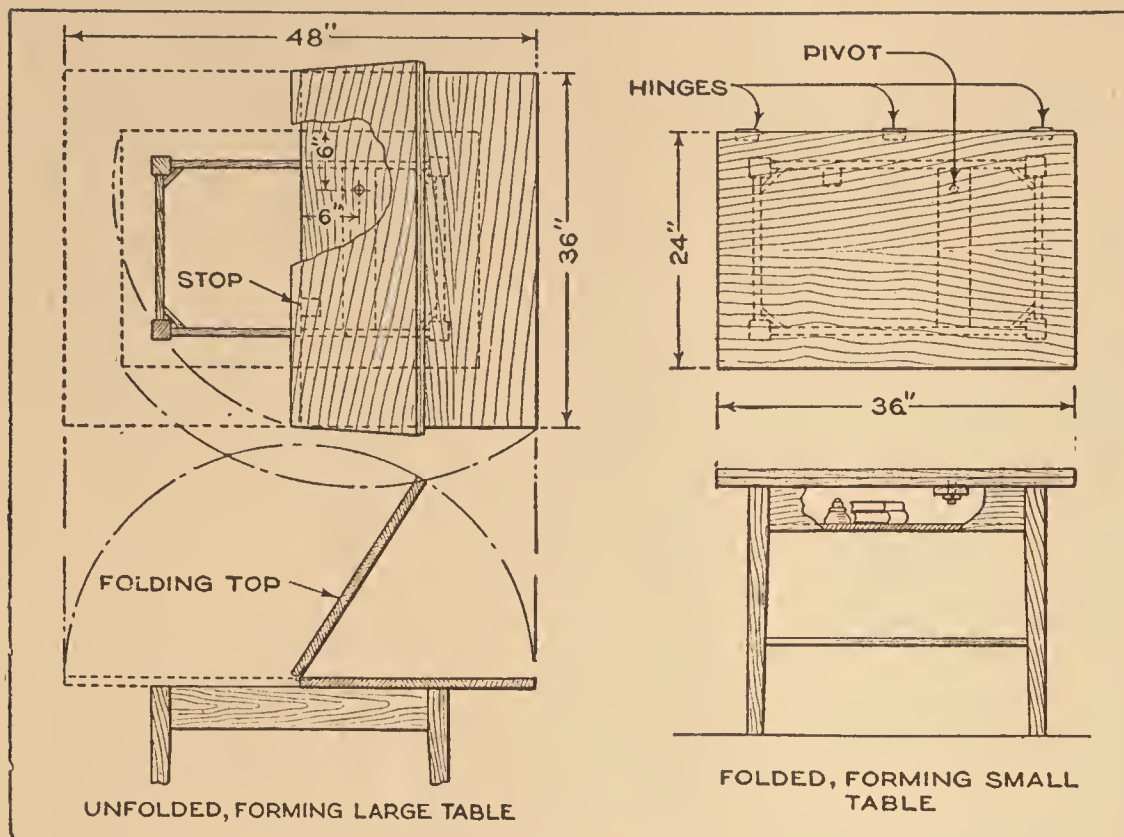
A Method of Mounting Loop Aerials That Does Away with Unsightly and Bulky Frames: The Wires may be Concealed by a Wallboard Panel

Signals may be heard at wave lengths greater than those for which a loop is intended, but never less; this is important to remember when tuning in on short wave lengths, and care should be taken to cut out dead-end effect. Loop aerals work on a great

variety of circuits, but the best results are obtained with the high-amplification circuit given in the smaller drawing.

A Convertible-Top Table

In these days, when it is not only desirable but absolutely necessary in some cases to obtain maximum economy as far as the space occupied by furniture is concerned, the convertible table herewith



Increasing the Capacity of an Ordinary Table by Two by Adding an Extra Top and Pivoting the Whole So That It can be Swung in a Semicircle

described represents a long-sought improvement.

It has two tops, each 24 by 36 in., made of suitable material and thickness to prevent warping. These are joined together along one of the long edges by three hinges, so that they can be folded. The rest of the table must be well braced because the top is not fastened to the frame. The pivot point is located 6 in. from the center line and from the edge, as shown. A crosspiece of 1 by 3-in. material is fastened to the inside of the table frame, and the location of the pivot point transferred to it. One method of pivoting the table consists of a simple bolt through the lower top and the crosspiece, and countersunk in the top.

A stop block is fastened to the underside of the lower top in such a manner that when the top is swung around, it will be brought to a stop in the proper position. Hooks or latches, not shown in the drawing, may also be used for locking the tops in their respective positions.—Franz Szabo, Kewanee, Ill.

☞ A solution of potassium hydroxide applied to a painted surface and permitted to stand for several hours makes it possible to wipe off the old paint with a rag.

A Simple Typewriter Code

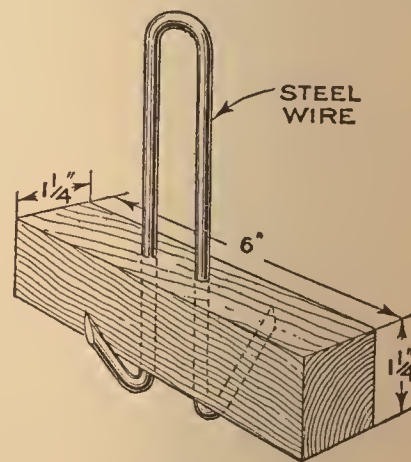
A simple secret code that is very easy to write, provided both parties have typewriters of the same make, consists in using the extra characters and figures with which every machine is equipped.

Thus, when writing a letter that it is not desired every one should read, the characters and symbols are used instead of the ordinary alphabetical characters. Such a letter will be a jumble of characters and symbols that will be practically undecipherable to anyone not possessing the key. The communication can be made still more mystifying by occasionally inserting a word written in the ordinary characters. A sample sentence "will arrive at six fifteen; be sure and be there," as rendered by the typewriter code, might read "28 # @44'3 @5 \$8) f8f533:.. Be \$743 @:% "3 5=343." Obviously any other combination of symbols can be similarly used.—Geo. E. Perkins, S. Bound Brook, N. J.

Hook for Lifting Window Screens

Instead of carrying window and door screens through the house to an upper floor, with consequent peril to bric-a-brac and interior finish, a simple grappling hook permits the screens to be drawn up from the outside.

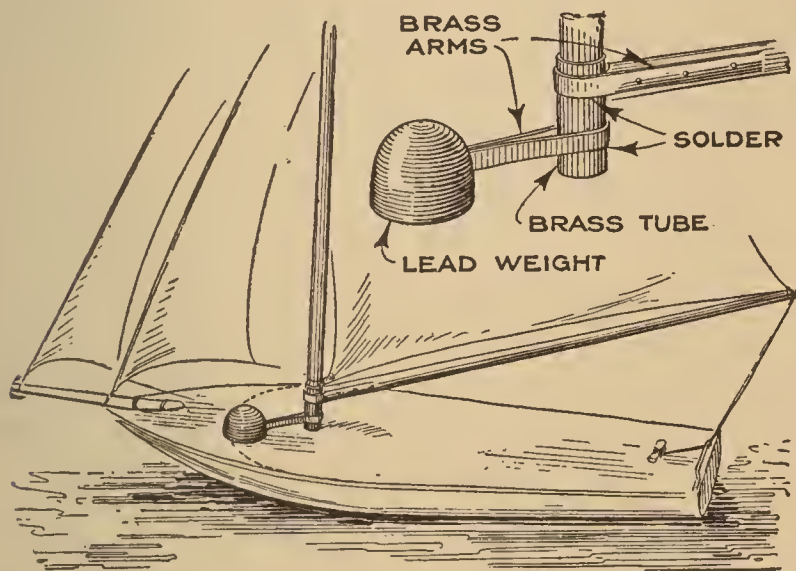
The crossbar should be set low down on the hook to prevent it from turning and perhaps dropping the screen. Set all the screens for the upper floors against the house directly underneath the windows in which they belong, and with the screen side toward the house. Then lower the hook at the end of a cord and it can be easily caught under the center of the top crossbar of the screen frame, which is then drawn up and placed in position.



Live Ballast for the Model Yacht

When the skipper of a racing sailboat goes out for a speed trial he usually carries "live ballast"; that is, two or three of his crew shift their weight to the windward side of the boat, as may be necessary. This permits him to carry a greater spread of canvas than would otherwise be possible.

With a model yacht the same effect can be obtained by using the attachment shown. A $1\frac{1}{4}$ -in. length of brass tubing, large enough to slip over the mast, is obtained, and a strip of sheet brass is bent around the tube and soldered, the end of the boom being lashed between the ends of the strip. A similar brass arm, about half the length of the beam, or width, of the boat, is soldered to the tubing exactly opposite the boom. A ball of lead is soldered to the outer end of the second arm.



A Simple Counterbalance Applied to the Mainsail Boom of a Model Yacht Takes the Place of "Live Ballast"

When completed, the tube is slipped over the mast and several turns of wire are made around the mast just above it, to keep the boom from working up. The proper weight for the lead ballast must be found by testing the boat in water.

The action of the device is simple; when the boom is forced out by the wind, the ball of lead is swung out over the windward side, tending to balance the pressure of the wind on the sail.—Edwin M. Love, Alhambra, Calif.

Frame for Displaying Documents

Old or historic documents and papers are conveniently displayed by placing them between two pieces of glass mounted in an ordinary picture frame; this arrangement permits both sides of the document to be examined and also makes the watermarks visible.—J. Alexander, Lincoln, Neb.

Old Pipe Aids in Building Fence

When stretching some poultry netting to inclose a run, I found considerable



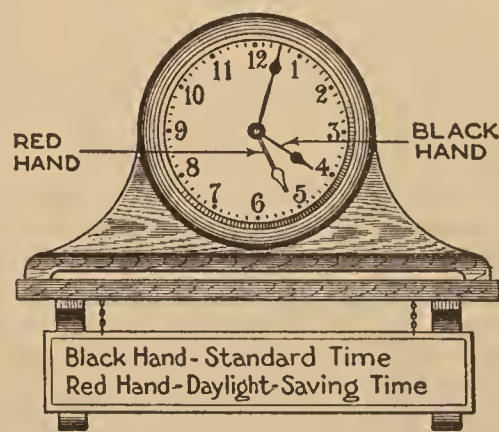
A Piece of Old Pipe Inserted through the Individual Meshes of Poultry Netting to Make the Bottom Tight and Prevent the Fowls from Crawling under It

difficulty in making the wire sufficiently tight at the bottom so that the fowls could not crawl under it.

I had intended to drive stakes into the ground and attach the wire to them, but before doing this, I thought of some old water pipe that had been thrown on the junk heap because it was cracked. One of these pipes was drawn through the individual meshes near the ground, with the result that a much neater and more effective piece of work was obtained than if the stakes had been used.—John Y. Beaty, Chicago, Ill.

A "Daylight-Saving" Clock

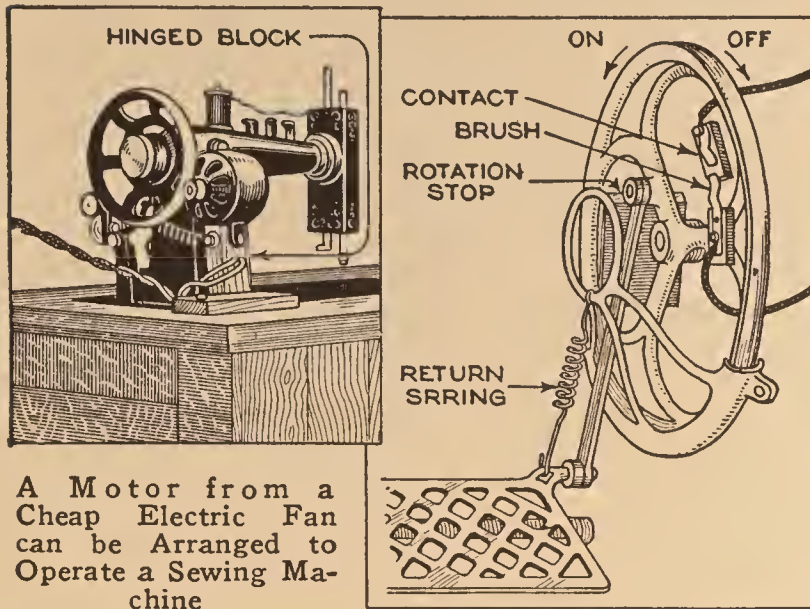
In communities where daylight-saving and standard-time systems overlap, much confusion and some inconvenience is caused by the difference in time indicated by the clocks in stations and other public places, which, despite conspicuous placards, are often misread.



However, by putting two hour hands on such public clocks the confusion can be practically eliminated. A red hand is used to indicate daylight-saving time, while the regular black hand shows the standard time, which is in all cases an hour slower than the former. A sign below the clock explaining the position of the two hands further serves to avoid misunderstanding.—Richard F. Lufkin, Medford, Mass.

Attaching an Electric Motor to a Sewing Machine

The electric motor shown attached to the sewing machine in the drawing was taken from a small electric fan, costing about \$5. The cast-iron base was taken



A Motor from a Cheap Electric Fan can be Arranged to Operate a Sewing Machine

from the motor, and a wooden support fitted in its place; this block is long enough to hold the motor at the proper height, and stands on a flat wooden base to which it is attached with a hinge, permitting the motor to swing toward the flywheel of the machine. A spring is used to keep the pulley in close contact with the flywheel. A single bolt, passing through the belt hole, holds the wooden base to the sewing-machine table. A disk of rubber, about $\frac{3}{4}$ in. in diameter and $\frac{3}{8}$ in. thick, was cut and tightly fitted onto the shaft of the motor, and a groove was formed in this disk by running the motor and holding a sharp round file against the edge of the disk, the finished diameter of which was about $\frac{5}{8}$ in. As motors of this type are small and do not operate the machine at much more than 400 stitches per minute, only one speed is needed, thus doing away with the need for some device to control the speed. All that is necessary is to fit a contact-making device to the treadle wheel, as shown in the drawing.

A block of wood is screwed to the side of the cabinet and between the spokes of the wheel, to limit its rotation to about 3 in. when the pedal is pressed down. Another block is fitted to the wheel spokes to carry the brass brush. A wire is connected from this brush to a flexible extension; the other wire is connected to a contact piece mounted on a hardwood block attached to the cabinet.

In operation, the treadle is pressed down and the crank rotates the wheel in the "on" direction as far as the wooden stop will allow. At this point, the brush should make contact with the contact

piece and start the motor. When the treadle is released, the spring returns the wheel to the position shown, and breaks the circuit.—A. D. Robbins, New York, New York.

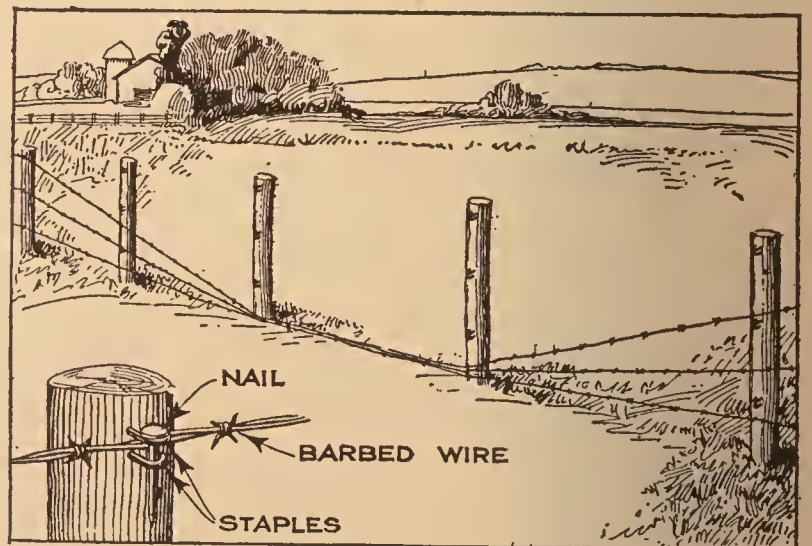
Sunbeam Used as Sight Line

It is sometimes necessary to erect a row of stakes when a line that is long enough to serve as a guide in setting them is not at hand. If the sun is shining and there are no obstructions in the way, a small pocket mirror can be used to run the line. The two end stakes are placed and the mirror is fastened to the top of one of them so that the beam of reflected sunlight is focused on the opposite stake. It will now be seen that there is a straight beam of light between the two stakes, and the other stakes to be placed are moved about until they are directly in this beam. It is necessary to commence placing the stakes from that one which is farthest from the mirror.—Geo. E. Perkins, S. Bound Brook, N. J.

Gate Made in Fence without Cutting Wires

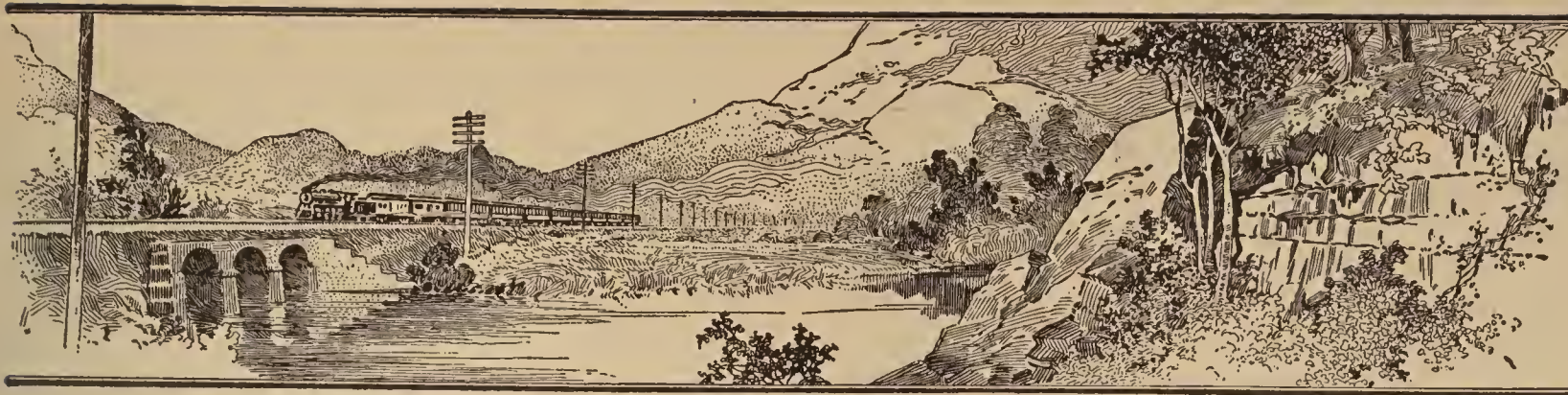
Farmers often loosen the wires of a fence from a few posts and weight them down to make a temporary opening which can easily be made into a permanent gate that the casual observer would hardly notice.

Instead of fastening the wire to the posts in the usual manner, staples are driven horizontally on each side of the wire. The staples are set into the post far enough to leave an eye through which



A Simple Method of Making an Opening in a Wire Fence Where a Gate of the Regulation Type would Seldom be Used

a nail is inserted to hold the wire to the post. The wires are kept down by hooking them over nails driven into the posts near the bottom.—Warner H. Ellis, Mt. Vernon, Ill.



Simple Furnishings for the Home Grounds

By ROY BROWN

AT a surprisingly small outlay for materials, the home owner can add materially to the beauty of his surroundings, by the judicious use of trellises and similar furnishings made of wood.

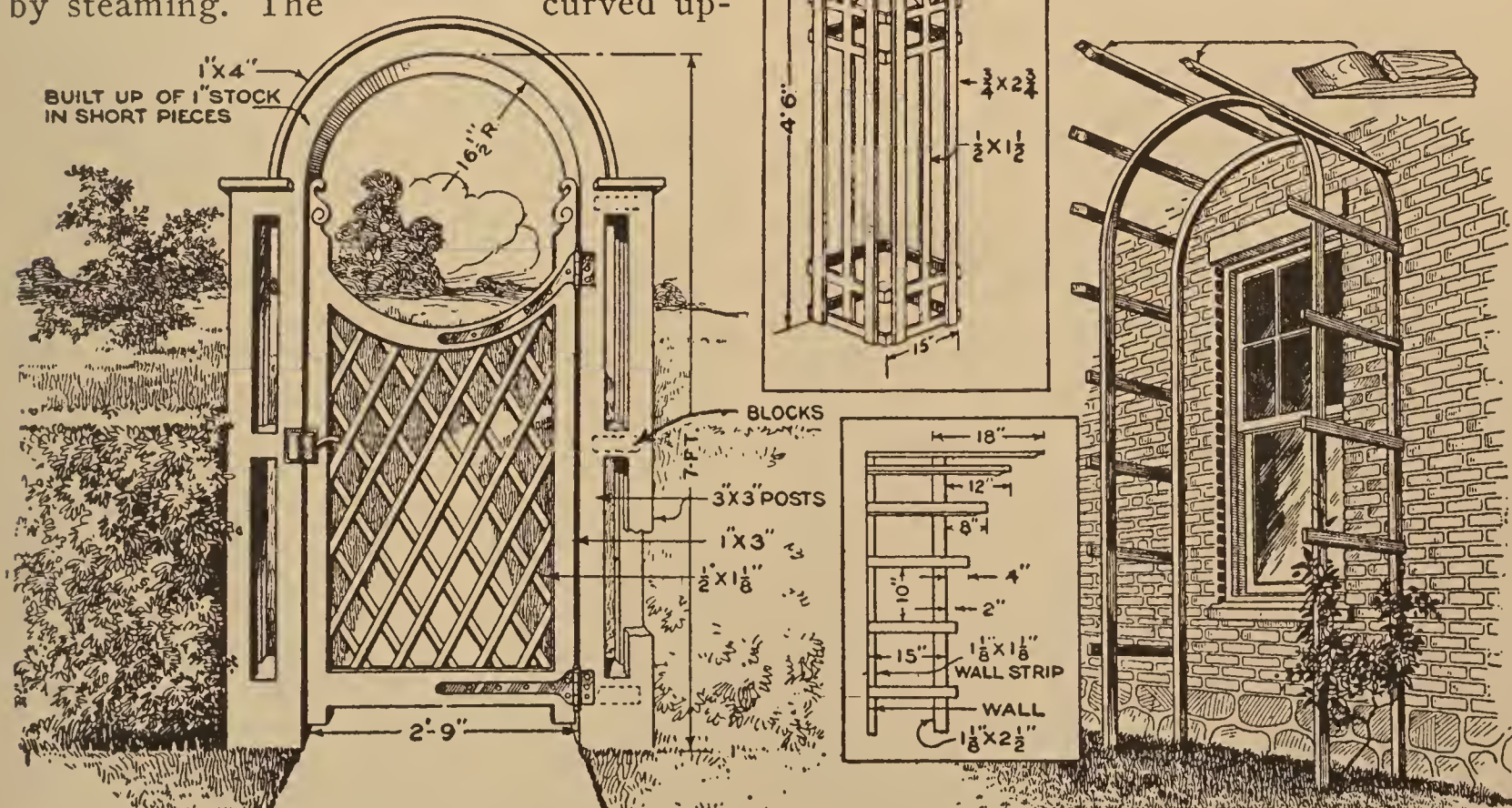
Any kind of wood may be used, but as this class of woodwork is exposed, and in contact with moisture, cypress, which is almost immune to rot from this cause, should be given the preference.

A pleasant first impression is given to the visitor who passes through a gate of the type illustrated. The side pillars are each built up of four 3 by 3-in. posts, which are joined together by blocks, nailed to, or mortised into, the posts so as to keep them 3 in. apart. The joints between blocks and posts should be glued, and will be invisible when the pillars are painted. The gate itself is a latticework of $\frac{1}{2}$ by $1\frac{1}{8}$ -in. slats, held in place between side and end rails of 1 by 3-in. material. The heavy portion of the arch joining the top of the pillars is built up of 1-in. stock in short pieces, the 1 by 4-in. rail being bent by steaming. The curved up-

per hinge, if beyond the ability of the amateur to make, can be made by any blacksmith. These few directions should enable anyone to build this charming gate.

A sundial adds immensely to the appearance of the lawn, and the simple one shown will appeal to those who do not want to go to the trouble of making or purchasing a more elaborate one. Little need be said of its construction beyond the fact that each side is nailed up separately, then the whole assembled, allowing some of the vertical posts, of $\frac{3}{4}$ by $2\frac{3}{4}$ -in. stock, to project about a foot, so they can be set into the earth.

The severity of plain walls can be offset in some cases by a simple trellis placed over a window, as shown. The inner frame is of $1\frac{1}{8}$ -in. square stock, and the outer one of $1\frac{1}{8}$ by $2\frac{1}{2}$ -in. stock; the latter is placed with its narrow face outward, and both are steamed



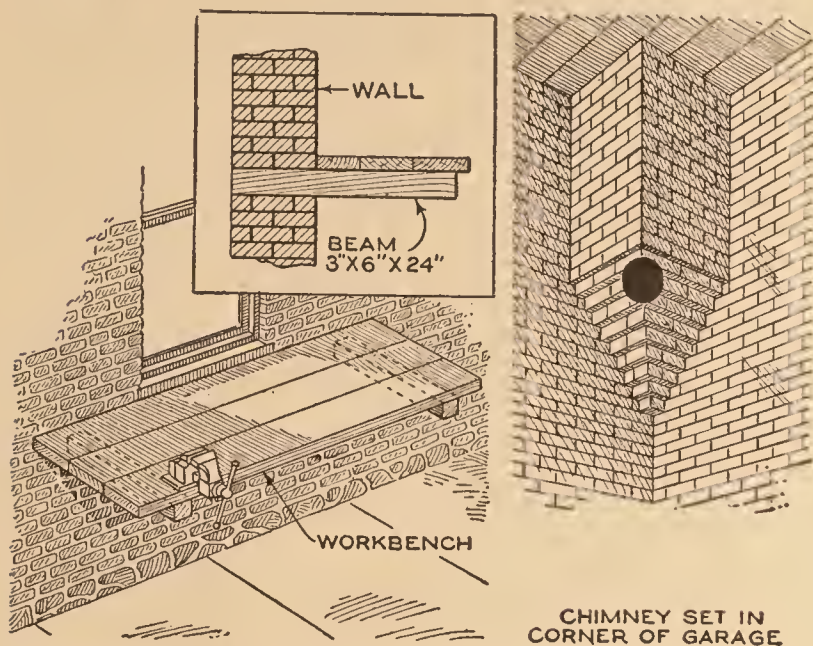
Attractive Garden Furnishings That Materially Enhance the Beauty of the Home Garden: The Material Cost Is Low, and by Using Cypress, Immunity from Rot Due to Moisture is Obtained

and bent to the proper radius. The outer ends of the cross strips, also of $1\frac{1}{8}$ by $2\frac{1}{2}$ -in. cypress, are shaped as shown in the enlarged detail.

By setting out plants of climbing habit at the sides of this trellis, a considerable amount of shade may be obtained, particularly desirable when the window so treated is exposed to sunlight during a large part of the day.

Refinements in Garage Building

Two details that any garage owner will readily appreciate can be incorporated into the brick or concrete work at prac-



A Method of Mounting Bench Supports and of Building the Chimney in the Garage So As to Obtain a Clear Floor Space

tically no cost, provided the designer has the foresight to include them. The first is supports for a workbench in the side-wall, which does away with the need of vertical legs extending to the floor. These supports are 2-ft. beams, about 3 by 6 in. in cross section, set into the wall about 3 ft. from the floor. All that is required to complete the bench is the lumber to form the top.

The second is a chimney for the heater or stove that is so desirable in cold weather, in making repairs, or for preventing the circulating system of the car from freezing. The chimney is corbeled at the bottom so that it can be built without taking up any of the floor space, which is usually at a premium.

Washing Prints in Plate-Washing Box

An ordinary negative-washing box can be used for washing prints, particularly those made on double-weight paper. Two such prints are placed back to back and inserted into the grooves of the washing box, and washed in the same manner as glass plates.

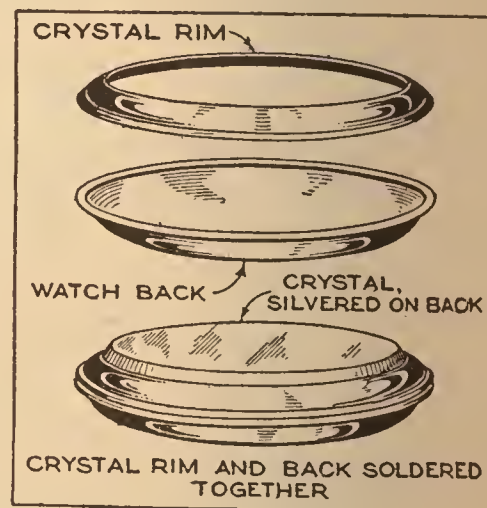
Remedying Leaky Fountain Pen

Fountain pens that ordinarily feed ink at the proper rate often feed too fast during the first few minutes of use. The reason is that the heat from the hand causes the air in the barrel to expand and so forces the ink out. If the fountain pen is held point upward and a slight pressure made on the self-filling device until a few bubbles escape through the ink feed, and then, maintaining this pressure and placing the point of the pen downward, the pressure is released, the ink on the pen will be drawn in, and a blot averted. Usually the pen will then feed at the proper rate but sometimes, especially when it is nearly empty, it may be necessary to repeat the operation.

For fountain pens not equipped with a self-filling device, the remedy is to hold the pen, point upward, a moment, until it has attained the temperature of the hand, so that the expansion will force out air instead of ink.—K. M. Bard, Manawa, Wisconsin.

Vest-Pocket Mirror from an Old Watch

A neat and substantial vest-pocket mirror can be easily made from an old watch. The front and back parts of the case are neatly soldered together on the inside, the works and middle part of the case being discarded. The crystal, which is removed before soldering the two parts of the case together, is silvered on the back and replaced.



Any of the various silvering formulas may be used, but perhaps the best for this particular purpose is made in two separate solutions. The first solution is made of 8 oz. of distilled water heated to the boiling point, when 12 gr. of silver nitrate and 12 gr. of Rochelle salts are added. After the solution has boiled for about five minutes, it is cooled and filtered. The second solution consists of 8 oz. of distilled water, in a small quantity of which 19 gr. of silver nitrate is dissolved. Several drops of ammonia are added, until the solution becomes clear, and 16 gr. more of silver nitrate is then added and dissolved. The remainder of the distilled water is added

and the solution filtered. The two solutions are kept in separate bottles, marked so that they may not be confused.

To silver the glass, clean it with ammonia and wipe with a piece of clean, damp chamois skin. Then stir up equal parts of each solution together in a glass, pour the contents into the concave back of the crystal, and allow it to remain until the solution precipitates.

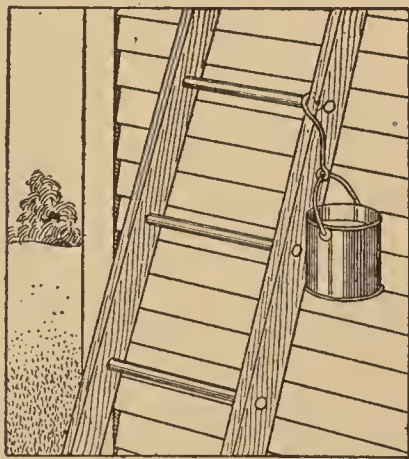
A Simple Mole Trap

A cheap and effective mole trap can be made from two empty tin cans. With a can opener, cut the lid of each can until it is held in place by only $\frac{1}{4}$ in. of tin, in which condition it should be "springy," and press it slightly inward.

To set the trap, carefully remove the earth from the mole run, taking pains to prevent the hands from contact with the soil, for the mole is suspicious and keen of scent. Then lay the two cans in the burrow with the blind ends touching. Cover up the hole carefully, to exclude the light, and await results. The mole traversing the runway in either direction, arrives at the partly open can and pushes on past the yielding lid. On finding no outlet at the blind end, it attempts to back out, whereupon it comes against the springy lid which prevents its escape.—B. A. Reynolds, Sacramento, Calif.

Wire Hook for Paint Bucket

An improved wire hook, for holding a paint bucket out of the way when working on a ladder, consists of a piece of heavy wire, about 10 or 12 in. long, with one end fastened to the handle of the bucket and bent at the opposite end to fit over a rung of the ladder. After the hook is formed, it is placed over the rung and bent so that it reaches across the edge and down the side of the ladder rail, as shown in the drawing. A hook of this kind holds the bucket out of the way, and keeps it level at all times.—Jesse L. Blickenstaff, North Manchester, Ind.

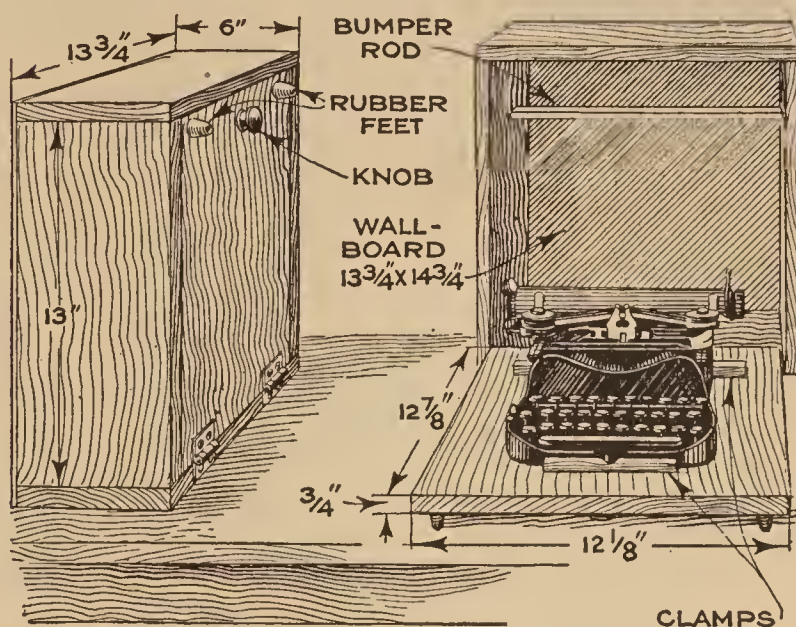


A hook of this kind holds the bucket out of the way, and keeps it level at all times.—Jesse L. Blickenstaff, North Manchester, Ind.

¶A whist-score marker is convenient for keeping count of the stitches when knitting.

A Space-Saving Typewriter Cabinet

The style of cabinet shown in the drawing is one of the handiest and best ways of stowing a typewriter in stores and simi-



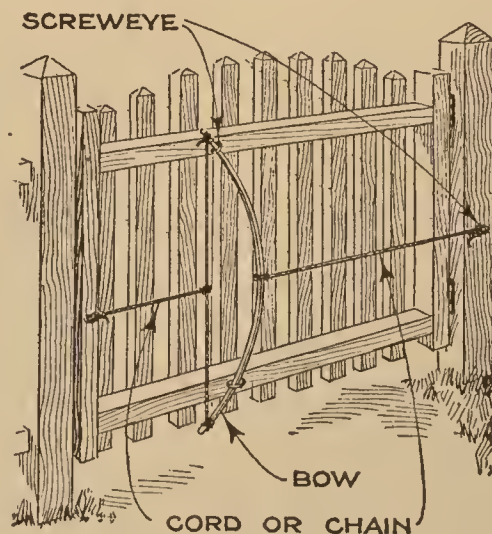
A Space-Saving Typewriter Cabinet in Which the Machine can be Protected and Pushed Out of the Way in the Busy Store or Office

lar places where space is scarce. It is designed and built to hold a writing machine of the portable, folding type, although it may be made for standard machines by altering the dimensions.

The machine is held to the hinged cover with clamps at the front and rear, the rear clamp being a 10-in. strip of $1\frac{3}{8}$ -in. material; the front clamp consists of a $\frac{5}{8}$ by 3-in. block held in place with a wing screw. The bumper rod is so placed that it will take up all lost motion when the cabinet is closed, and is covered with rubber where it comes into contact with the machine.

A Bowspring for Closing the Gate

A novel method of using a bow, resembling the primitive weapon of the Indians, is to apply it as a gate or door-closing device. The bow, which is made of some tough, flexible wood, like hickory, is attached to the gate as shown in the drawing. Screweyes are turned into the top and bottom stringers of the gate, on the inside, and the ends of the bow are inserted through these. The bow is connected to the gatepost with a light chain, or strong cord, attached to its center, and

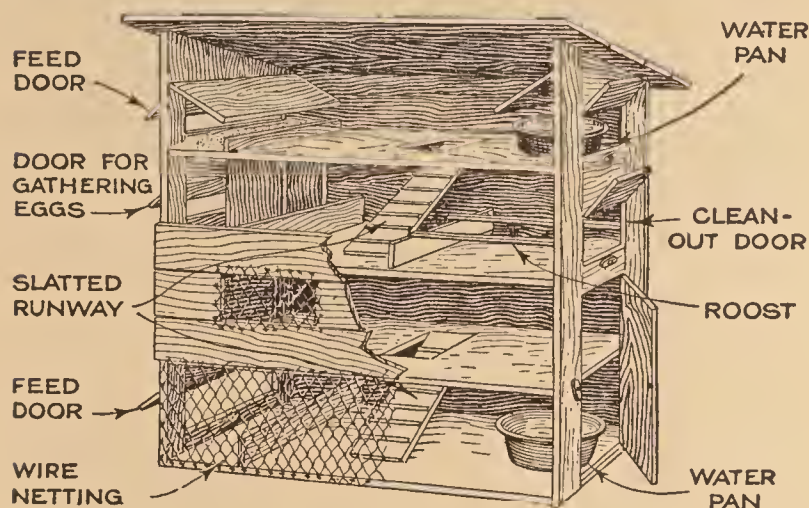


connected to the gatepost with a light chain, or strong cord, attached to its center, and

a similar connection is made from the bowstring to the edge of the gate in the manner indicated in the drawing. The gate must open away from the side on which the bow is mounted.—J. G. Allshouse, Vandergrift, Pa.

A Combination Rabbit Hutch and Poultry House

Lack of ground space prevents many city dwellers from raising rabbits and poultry, although they would like to do



A Combination Poultry House and Rabbit Hutch by Means of Which the Dweller in Crowded Surroundings can Raise His Own Poultry and Rabbits

so. The drawing shows a combination rabbit hutch and poultry house that is sufficiently large to accommodate about half a dozen hens and the same number of rabbits. As the drawing shows, the combination coop is a four-decked structure; the two lower compartments are for the rabbits and the upper ones for chickens, or other poultry, each division being made about $1\frac{1}{2}$ ft. high. Small doors, hinged at the top, permit water and food to be inserted easily; suitable doors are also provided at the opposite end of the coop for the removal of litter. Slatted runways are provided between the decks of the rabbit and chicken compartments, respectively.—J. H. Van Nice, Waukon, Ia.

Silver Contact Points for High Voltages

The radio-telegrapher handles much heavier currents through his key than the wire operator, and is subject to more or less trouble by reason of the contacts wearing under the high voltage; this causes a reduction of the alternating-current potential fed to the primary of the transformer, and lowers the efficiency of the transmitter. The trouble is easily remedied by soldering two small silver coins to the contacts, having first filed down and leveled the old points.—F. L. Brittin, Chicago, Ill.

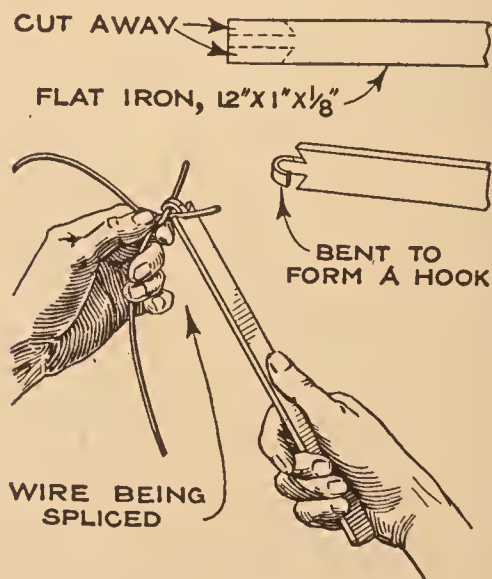
Resetting Window Panes

Loose window panes are usually caused by the putty yielding to the repeated contraction and expansion of the glass and woodwork under the influence of temperature changes. Sooner or later the putty will become loose and fall away, and some of the panes will be loose enough to make a disagreeable rattle.

When reglazing, the pane should be removed and reset in a putty seat, because if the glass is merely set into the sash and puttied around the outside, the moisture that collects and condenses on the glass inside the room will trickle down between the sash and glass; there it freezes, and pushes the glass and putty a trifle outward. Unless the water should evaporate, this action is repeated indefinitely until the putty has been broken away, and an opening is made which allows the water to drain out. Thick paint, brushed around into the corners and on the edges of the pane groove and seat, will largely prevent this action, the glass being set before the paint dries.—G. G. McVicker, North Bend, Neb.

A Wire-Splicing Tool

In splicing fence, telephone, and other wires, the simple little tool shown in the drawing will prove its value. It is made from a piece of flat iron of a convenient size, and formed as indicated. A hacksaw, or file, is used for cutting out sections $\frac{1}{4}$ in. wide by $1\frac{1}{4}$ in. long, on each side, leaving a projecting tongue which is bent



over into the form of a hook.

To use, cross the wires to be joined, hook the tool over one piece, and let the other wire fit into one of the notches. The tool is then turned until the wire is securely wrapped, the operation being repeated with the remaining end of the wire.—G. A. Tibbans, Galena, Kan.

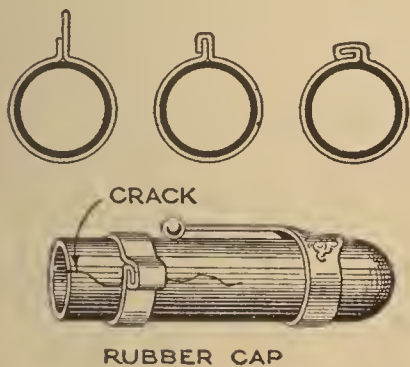
☞ A nasal atomizer can be used with telling effect for spraying the underside of plant leaves with insecticide solutions.

Notches Aid Loading of Plate Holders

Most camera plate holders have each side of the slide marked or colored differently to indicate whether the plate has been exposed or not. However, when loading the plates in a dark room without a light, the slide is sometimes inserted backward, causing confusion later as to whether or not the plate has been exposed. To remedy this trouble, cut a row of fine notches on the wooden finger piece at the top of the slide, putting the notches on the "exposed" side. Then, when the notches do not show on the outside, it proves that the plate has not been exposed. This little dodge may sometimes be the means of preventing a double exposure on a valued plate.—Harold E. Benson, Boulder, Colo.

Repairing a Cracked Fountain Pen

The hard-rubber cap of a fountain pen frequently sticks, and in employing the force necessary to unscrew it, it is not an uncommon thing to crack it; it is then a case of getting a new cap or repairing the old one in the best way possible.



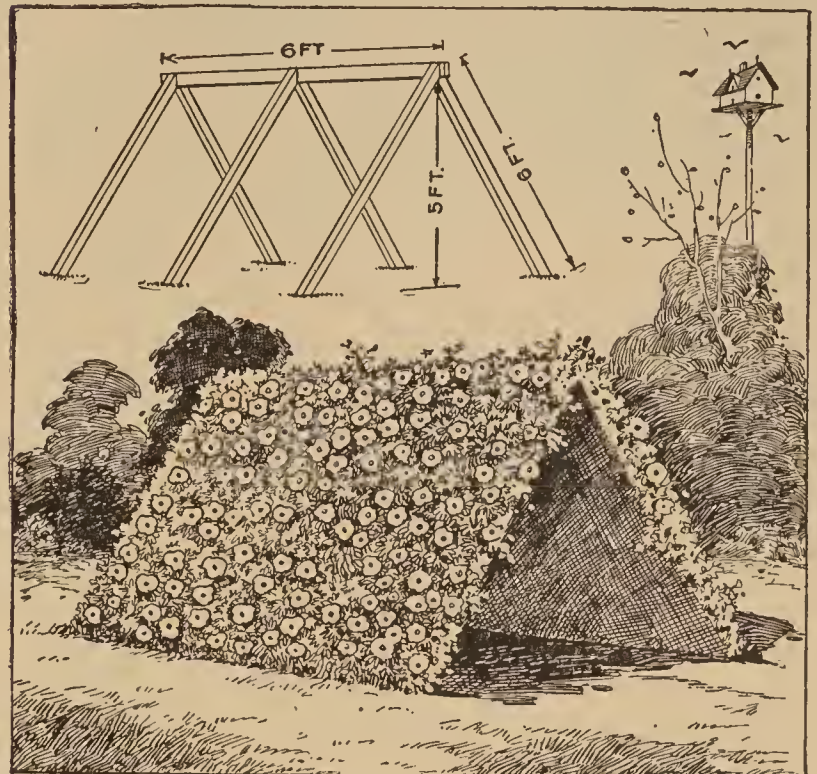
A method of repairing such breaks is shown in the drawing, and

consists in placing a thin metal band around the broken part. A piece of thin sheet metal is cut about $\frac{1}{4}$ in. wide, and long enough to go around the cap, with an extra $\frac{1}{2}$ in. allowed for making a joint; the exact length can be found by wrapping a strip of paper around the cap. Having cut the metal strip, it is bent around the cap and pinched into the position indicated in the upper left-hand corner of the drawing with a pair of pliers. Fold over the projecting single thickness of metal, and finally turn over the folded joint parallel with the cap. Thin sheet aluminum, such as is used in the manufacture of small advertising novelties, is very good for this purpose, as it can be cut with a pair of ordinary scissors and is easily bent.—C. H. Patterson, Pomona, Calif.

Tepee Covered with Vines

An attractive children's playhouse which does not spoil the appearance of the lawn, can be made as shown in the draw-

ing. It consists of a wooden frame covered with wire netting, over which vines are grown. The frame is made of seven 6-ft. two-by-fours, the rafters being set

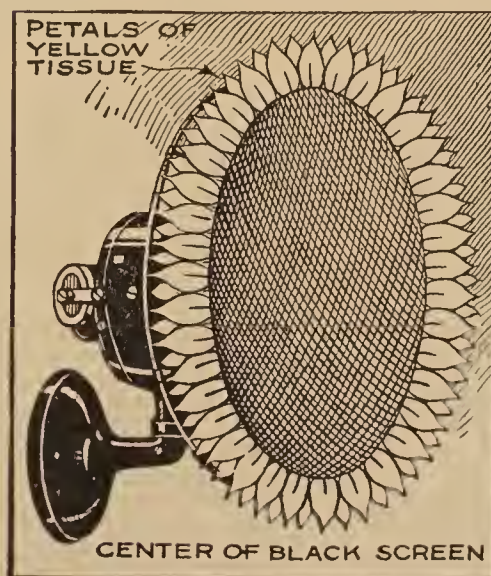


A Vine-Covered Playhouse Pleases the Children and does Not Injure the Appearance of the Lawn

with their bases 5 ft. apart. These are then covered with wire netting, and the seeds of wild morning-glory, clematis, or other rapid-growing vines are planted along the edges. The frame may be painted green for better appearance. In six or eight weeks, the playhouse is very attractively covered with vines and furnishes a fine place for the children to play.

Electric Fans Disguised as Sunflowers

The owner of a moving-picture theater, wishing to brighten the appearance of his place, conceived the idea of disguising his electric fans as sunflowers. Petals were cut from yellow crêpe paper and were mounted around the outer rim of the fan guard with library paste; to pro-



duce the black-center effect of the blossoms, circular pieces of black screen wire were stitched to the guard so that the proper convexity was obtained.—G. E. Hendrickson, Argyle, Wis.



TOURING IN THE AUTO

By JAMES TATE

Part I—Inexpensive Attachments for the Car

ABOUT this season of the year the auto owner begins to think longingly of the joys of the open road. More and more people are using their cars for long-distance trips every year, and, while many of them depend for sleeping and eating accommodations upon the hotels and restaurants en route, many more tourists like to rely entirely upon their own resources. It is for the latter class that this series of articles is written.

For the man who owns a certain popular light automobile and who does not care to go to the trouble and expense of building a special body for his car, there are numerous ways in which he may add to his own and his fellow travelers' comfort, with very little expense.

The first question to decide is that of sleeping accommodations. Figs. 1 and 2 show how comfortable beds may be rigged up with a minimum of trouble.

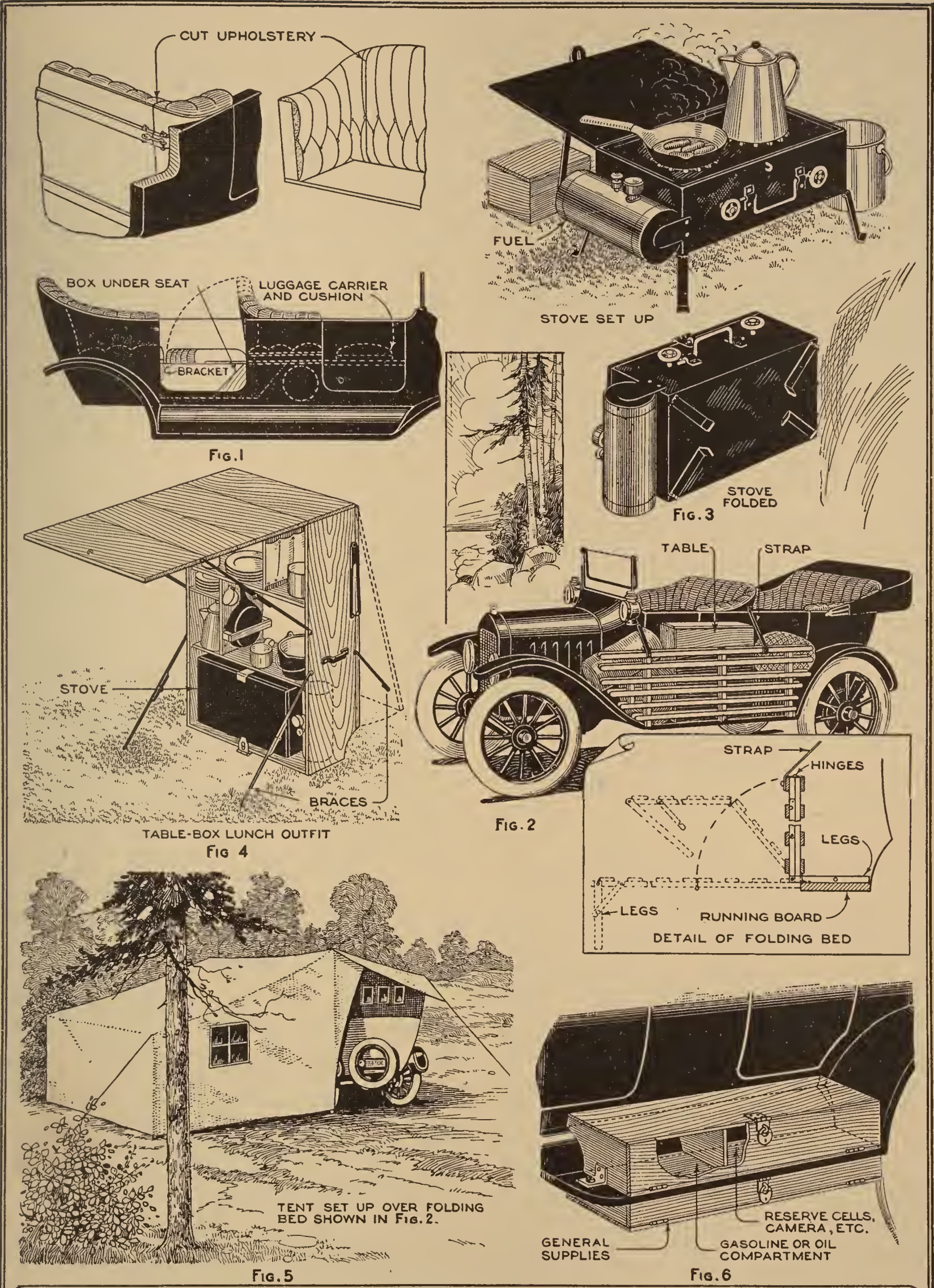
In Fig. 1 the back of the front seat of the touring car is cut and hinged so as to fall back, thus making a bed practically the full length of the car. Cut the back, at the point indicated, with a hacksaw, holding the saw at an angle, so that it will not catch in the sheet metal. The upholstery, of course, should be carefully cut first, before any sawing is done. When the back has been cut, two pieces of wood should be cut to fit between the walls of the back, and firmly nailed to it, from each side. Before nailing, the upholstery may be tacked back into place, or if a better finished job is desired, cut a piece of leather substitute, matching the seat covering, and tack it over the exposed edges of the metal. The seat back is hinged to the seat proper, at the bottom, and, when allowed to fall back, rests on a bracket screwed to the bottom board of the rear seat. On the inner side of the front doors, two brackets are secured, upon which rests a luggage carrier and cushion; this forms the front of the bed. The luggage carrier may be built up of $\frac{1}{2}$ by 1-in. wooden slats, somewhat simi-

lar to that shown in Fig. 2, but cut to suit the width of the car. With the illustrations given, no difficulty will be experienced by those who desire to construct this type of "Pullman."

In Fig. 2, a combined bed and luggage carrier is shown. It is built up of stout wooden slats, and is made in two parts, hinged in the middle. The inner half is hinged to the running board, and, as shown in the detail drawing, both parts drop outward to form a substantial couch. Pieces of 1 by 1-in. stock, attached to the outer half, form legs for the bed when extended. A pneumatic mattress may be used with this type; this has the additional advantage of not taking up much space when packed, although, of course, this is a matter of individual preference.

A bed of this kind should only be used with a tent like that shown in Fig. 5; and for comparatively short distances, where a tent is not desired, the first type is the more suitable, as, when the side curtains are drawn tight, no tent is needed. On the other hand, a tent such as the one shown may be used to shield the tourist from sun and rain when cooking, and, besides, the bed used with the tent does not demand so much care in construction.

After the sleeping accommodations have been provided for, the tourist will probably turn his attention to the preparation of his food and how he will equip this important part of his outfit. First and foremost will be the question of a stove. Just what kind to use depends altogether on the "cruiser" himself, and whether or not he wants to build a fire at every stop. For those who do not, the gasoline stove in Fig. 3 is recommended. A stove of this type may be bought, but by judiciously rearranging the fuel tank of a small gasoline stove, and inclosing the whole in a metal case in the manner shown, a surprising economy in space is obtained. An alternative



No One Gets More Joy Out of Life than the Automobile Tourist, Especially If He Elects to Avoid Hotels and Their Expenses, and Camps Wherever He Happens to Find Himself. Attachments That will Enable the Owner of the Light Car to Do This are Illustrated Above

suggestion is the use of acetylene gas in connection with an ordinary stove burner, the two being connected by a rubber hose. To keep the stove and the cooking utensils together, as they should be, a combination table and box, such as that shown in Fig. 4, may be used. The covers of the box are hinged at the top and provided with braces for holding them horizontal when raised, a similar set of braces being provided at the bottom to prevent its being overturned. Such a table enables the tourist to keep insects from his food, which he generally cannot do when he eats with his food on the ground. By inserting partitions of the proper size in the upper part of the box he can stow all his cooking utensils so that they will be protected against damage. The underside of the hinged sides can be provided with pockets to hold various small items, such as knives, forks, and spoons. The whole arrangement, when closed, is strapped down to the running board, from which it is always readily removable.

Figure 5 shows a method of using a tent over the car at night. Generally, a degree of skill that the average person does not possess is required to make a tent, and consequently no description of how such a tent should be built is given. However, any ordinary wall tent as long as the top when raised, will answer. The tent is thrown over the top of the car, and the corners guyed down in the regu-

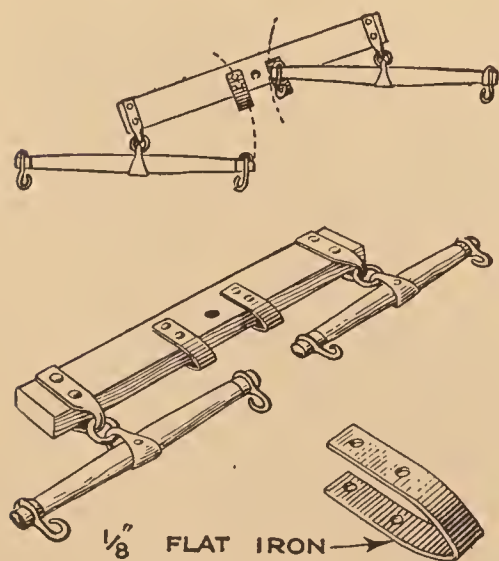
lation manner with or without poles. Where more than two persons make up the party a tent of some sort is an absolute essential, and if a trunk rack can be attached to the rear of the car it can be carried easily; at the same time, the bedding material can be wrapped up inside of it, where it is protected against dust and dampness. Various types of tents for this particular purpose are to be obtained on the market, but the seasoned tourist prefers the ordinary tent, even if it involves the necessity of carrying a set of tent poles.

There are various places about the light automobile that can be utilized for the stowage of a variety of articles, for which no provision was made by the builder, such as the box underneath the rear of the front seat in Fig. 1 and the running-board boxes in Fig. 6. Owing to its triangular shape, the box in the former drawing can best be utilized for carrying tire chains, jack, towrope, and accessories of a similar character, for which there may not be room in the tool box. The running-board boxes can be fastened either above or under the metal running board with angle irons at the ends, and form a convenient receptacle for reserve batteries, photographic supplies, emergency supplies of oil and fuel, and the like.

The building of a special body for the car, for the ambitious "land yachtsman," and the question of suitable supplies, etc., will be taken up in succeeding articles.

Preventing Locking of Singletrees

To overcome the locking of singletrees that occurs when two horses are used



which do not pull together, two pieces of flat iron can be attached to the doubletree in such a manner that the singletrees cannot catch. Two pieces of $\frac{1}{8}$ by $\frac{3}{4}$ by 12-in. flat iron are bent at the center, and the ends are spread apart to fit over the doubletree, in line with the inner ends of the singletrees. The irons are attached to the doubletree by bolts.—Mrs. Ruth Darling Shultis, Lansing, Mich.

A Felt-Pad Silver Cleaner

One of the most effective methods of cleaning silver is to use a felt-covered block. Several layers of felt are stretched over a block of wood, about 2 by 4 by 6 in., and tacked at the ends. A quantity of whiting is then rubbed into the felt, and the pad is moistened with ammonia before using. It is used in the same manner as the old-style scouring brick, but the results are much more satisfactory. It will not be necessary to renew the whiting frequently, but a few drops of ammonia added each time it is used is advised.

Keeping Fence Wires Taut

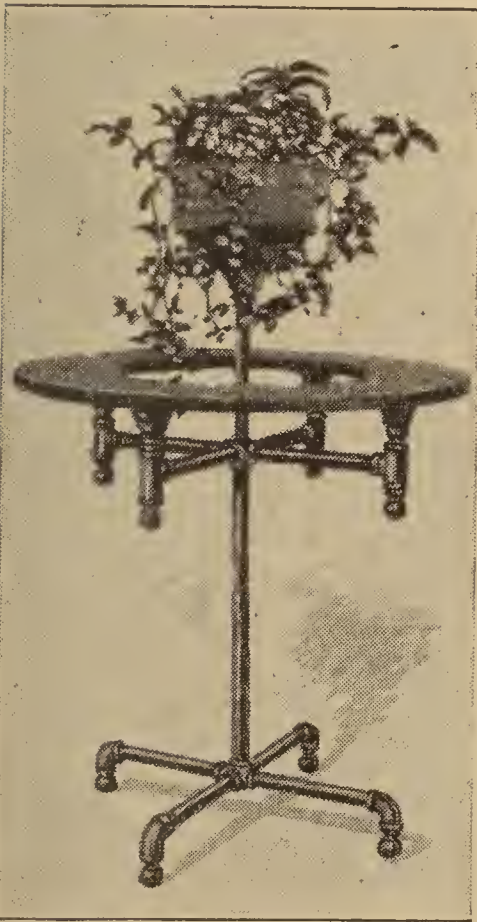
To keep the separate strands of a wire fence taut, bore holes through all corner posts to take long threaded eyebolts, to which the wires are fastened. When the fence is built, nuts and washers should be placed on the extreme ends of the bolts.—J. Sterling Bird, Poughkeepsie, N. Y.

Substitute for Ground Glass

A device for focusing an ordinary roll-film camera, without the necessity of using a plate-back attachment, can be made of a strip of draftsman's tracing cloth fastened to two film spools. The spools are put into the camera in the usual way and the tracing cloth is wound across the opening in the back. As the tracing cloth is pretty sure to be on the same plane as the film on which the image is to be recorded, a focus obtained in this manner will be almost certain to give a sharp picture. The objection to this system is that it can only be used once, before the first picture on each roll is taken, as the tracing cloth must be removed to insert the film.—H. R. Howie, Swansea, Ont.

Flower Stand of Pipe and Fittings

Pipe and fittings, which are easily obtainable at low cost almost anywhere, can

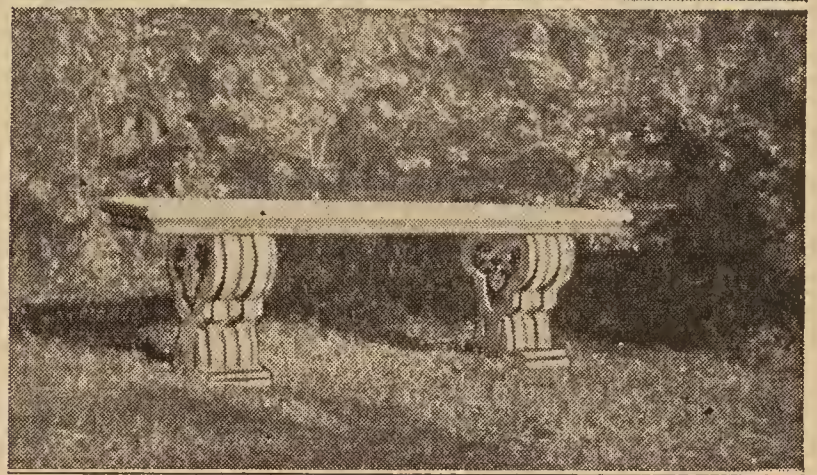


be combined to make an attractive flower stand, such as the one in the drawing. It will be observed that the pipe is all in straight lengths and that no bending is needed, which reduces the construction to its simplest elements. The central pedestal is extended above the circular table, and a small platform is provided for

a jardinière filled with trailing vines. The circular table may be made of two or more sections of wood. The materials composing such a stand are: one $\frac{1}{2}$ -in. railing floor flange; one piece of $\frac{1}{2}$ -in. pipe, 12 in. long; one $\frac{3}{4}$ -in. six-way cross; eight pieces of $\frac{3}{4}$ -in. pipe, each 9 in. long; four $\frac{3}{4}$ -in. railing floor flanges; four $\frac{3}{4}$ -in. malleable tees; four $\frac{3}{4}$ -in. malleable ells; eight $\frac{3}{4}$ -in. acorns; one $\frac{3}{4}$ -in. side-outlet cross; one piece of $\frac{3}{4}$ -in. pipe, 20 in. long, and four $\frac{3}{4}$ -in. close nipples.—Lester A Hitchcock, Kewanee, Ill.

Garden Benches from Discarded Trim

The architectural horrors of the past as embodied in highly ornamented cornice



Attractive Lawn Benches Made from Discarded Building Trim: The Upper Photograph Shows a Bench Supported on Old Porch Balusters; on Top of It is Seen Some of the Old Cornice Brackets Used in Making the Seat Shown in the Lower Picture

brackets can be made into attractive garden benches or seats.

Two pairs of the heavy brackets are nailed together, back to back, and a small section is sawed from the narrow end to give a flat base that can be nailed to a block. The top of the seat is made by nailing a molding around the four edges of a board of suitable size, the corners of the moulding being mitered. The upper photograph shows a similar bench which is supported in the same manner by old porch balusters.—Mrs. Alexander Nettle-roth, Louisville, Ky.

A Hint on Shingling

When shingling a roof, avoid the use of very wide shingles, as they are much more likely to split, warp, and buckle; use no shingle wider than 6 in. Use the old-fashioned cut nails or, better still, copper nails. Any roof under the influence of alternate dryness and moisture will sweat sufficiently to rust ordinary wire nails. Galvanized nails add but slight additional protection, hence the desirability of using copper nails.



TOURING IN THE AUTO

By JAMES TATE

Part II—The Land Cruiser

SINCE there are so many ways in which an automobile can be converted to touring purposes, and so many ideas of personal comfort and convenience to be taken into consideration, it is manifestly impossible to lay down any set rules and regulations for construction and arrangement. Much depends upon the size of the party that is making the trip; if there are not more than two, a touring-car chassis will perhaps answer, but if there are to be three or more, a truck is recommended, unless, of course, the party wants to carry tents and camp out literally.

If a touring car is to be rebuilt into a traveling dwelling, the first thing that must be done is to strengthen the rear spring, if it is not already stiff enough, to support the additional weight of the new body, without letting it down against the axle every time the car goes over a bump in the road, and it may also be necessary to lengthen the frame by one or two feet.

Next will come the construction of a body and here the builder gets his first opportunity to exercise his originality and ingenuity in devising new features that will add to his comfort on the road. Figure 1 illustrates a type of body that is easily built. It will be noticed that all corners are secured with body irons of various kinds and, if the owner is also the builder, he can have these made by "the village blacksmith" or buy them ready-made. Hardwood should

be used throughout and the sides covered with plywood, or heavy wallboard suitably waterproofed. Unless the owner is an experienced "hand" and has considerable skill, it would perhaps be better and ultimately more economical, to have the work done by a professional body builder. Also, for use on a popular make of light car, ready-made bodies for both passenger and truck chassis can be bought.

Figure 2 shows a type of automobile that is particularly pleasing in appearance, various views of its interior arrangement being shown below.

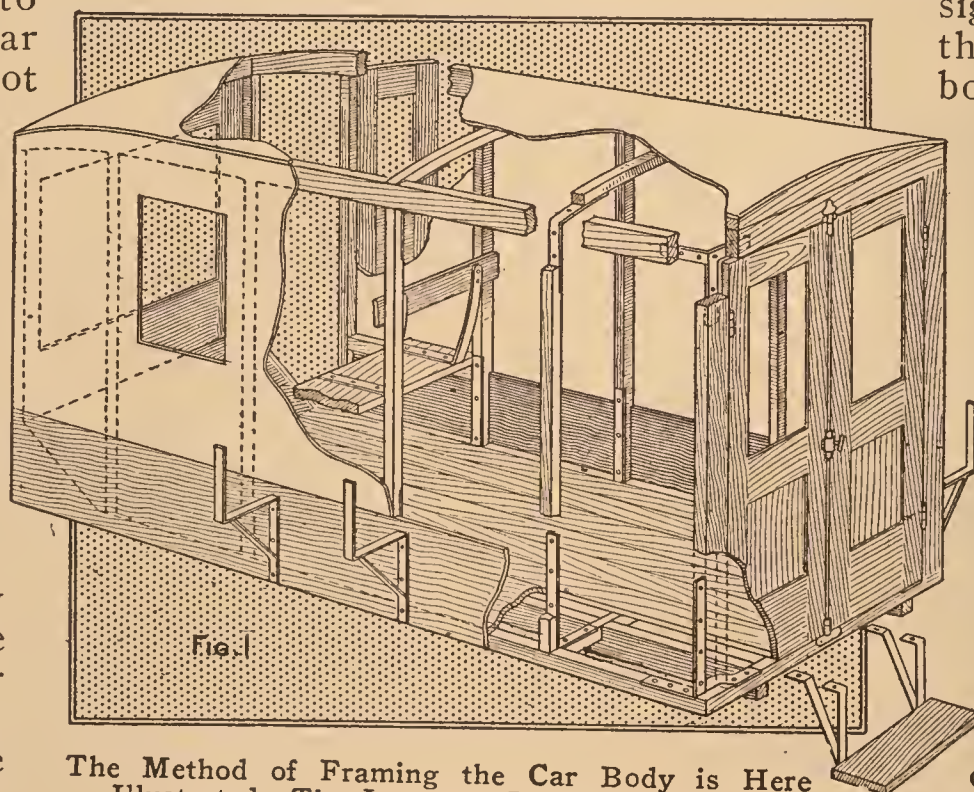
The drawing at the left, Fig. 3, shows an original idea of one bath-loving tourist who arranged a bathtub of his own de-

signing underneath the floor of the body. During the daytime, and when not in use, the tub served to hold the "crew's" bedding, and similar articles.

At the rear of the car are tanks for water, and fuel for the stove used for cooking, as shown in Fig.

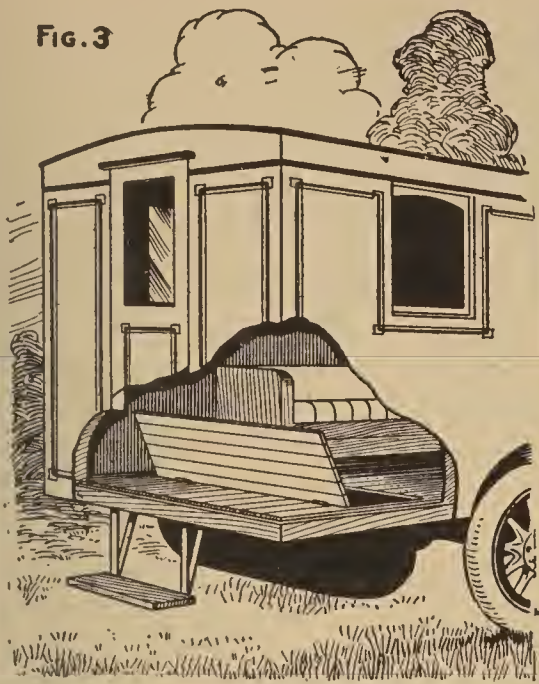
4. These tanks are placed in the corner on suitable brackets and held in place with straps,

the space between them being taken up by a locker for toilet materials, or it may be used as a storage for cooking utensils. An alternative arrangement, by means of which a larger quantity of water could be carried, would be to mount a single tank horizontally in the corner against the roof; then again, the tank might be mounted on the outside, above or below the car.

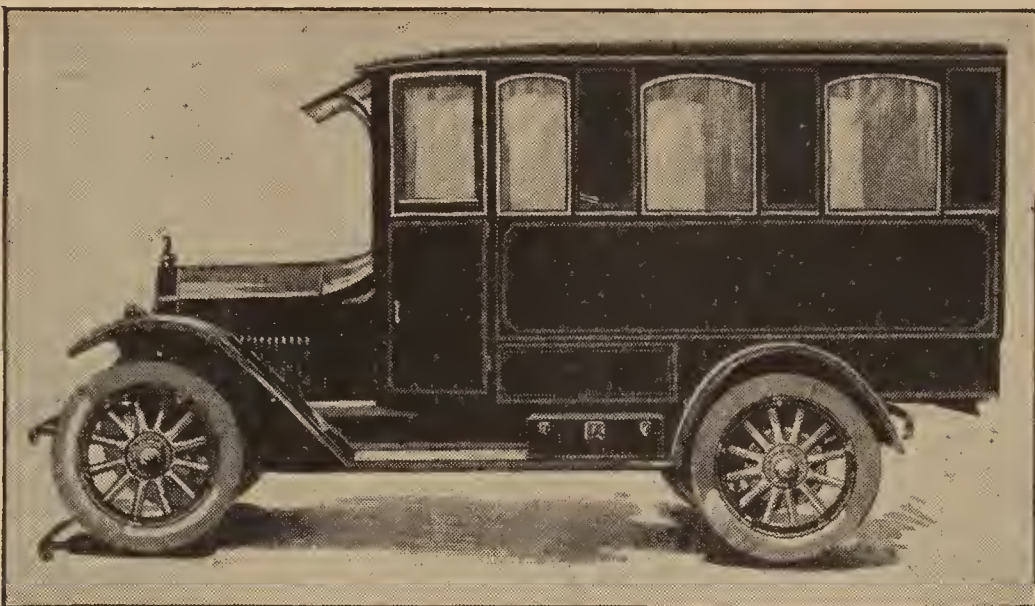


The Method of Framing the Car Body is Here Illustrated. The Luggage Carriers Are Necessary for the Body Shown in Figure 8

Fig. 3



SHOWING HOW BATH TUB MAY
BE ARRANGED ON TRUCK CHASSIS



EXTERIOR OF CAR
Fig. 2

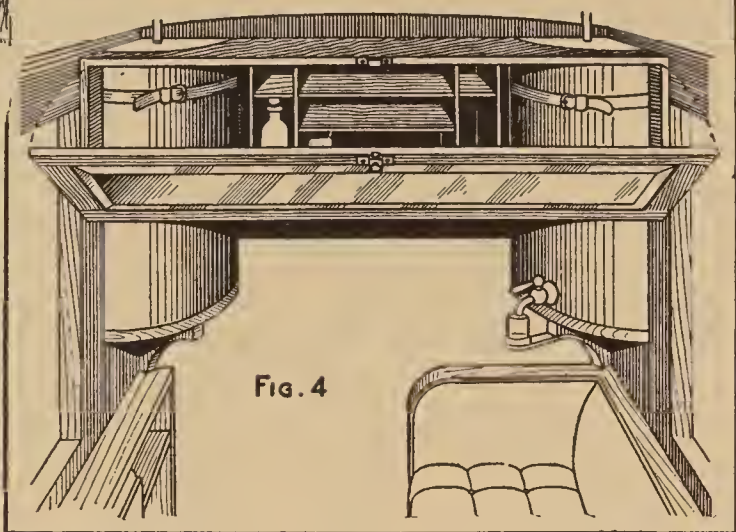
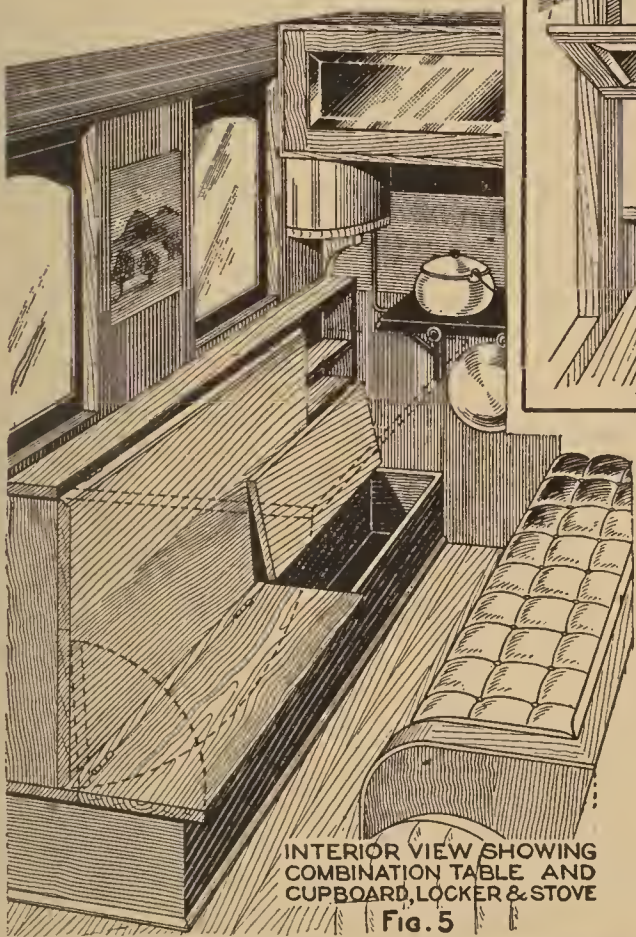


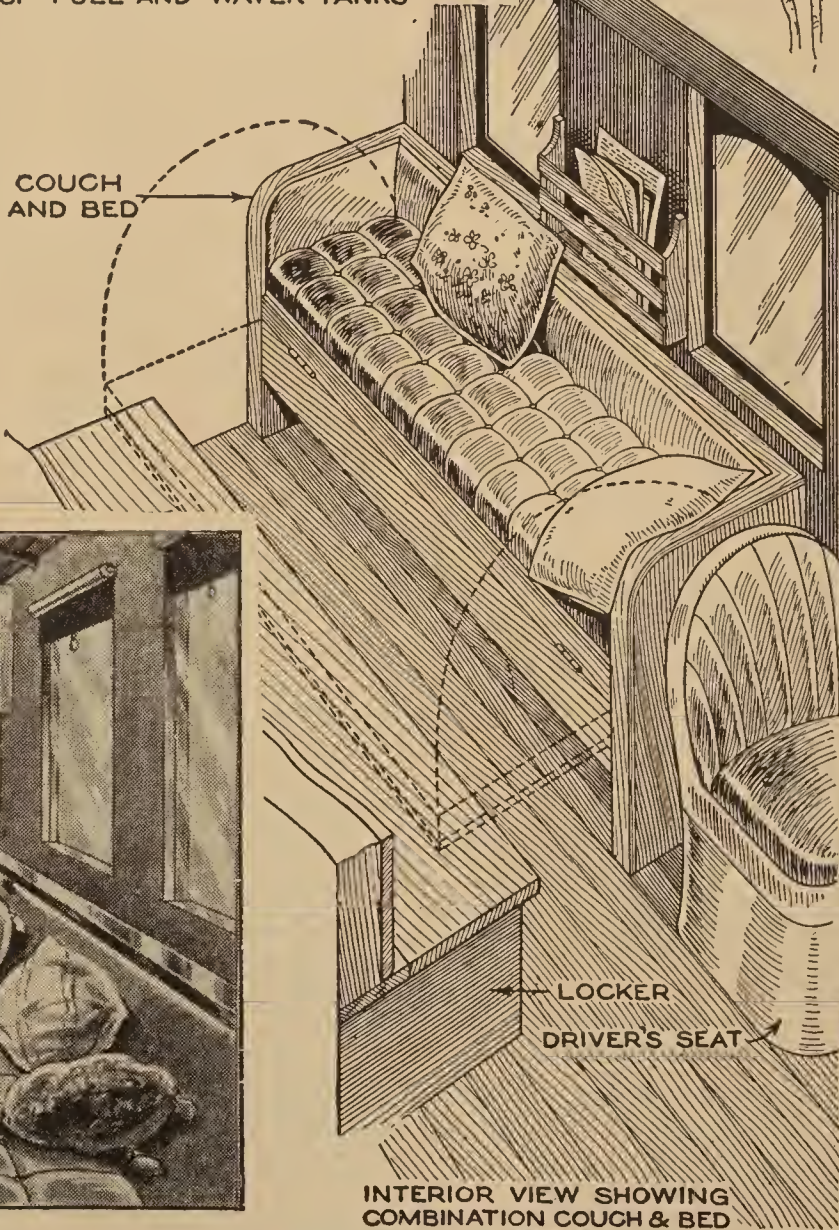
Fig. 4

VIEW OF FUEL AND WATER TANKS



INTERIOR VIEW SHOWING
COMBINATION TABLE AND
CUPBOARD, LOCKER & STOVE
Fig. 5

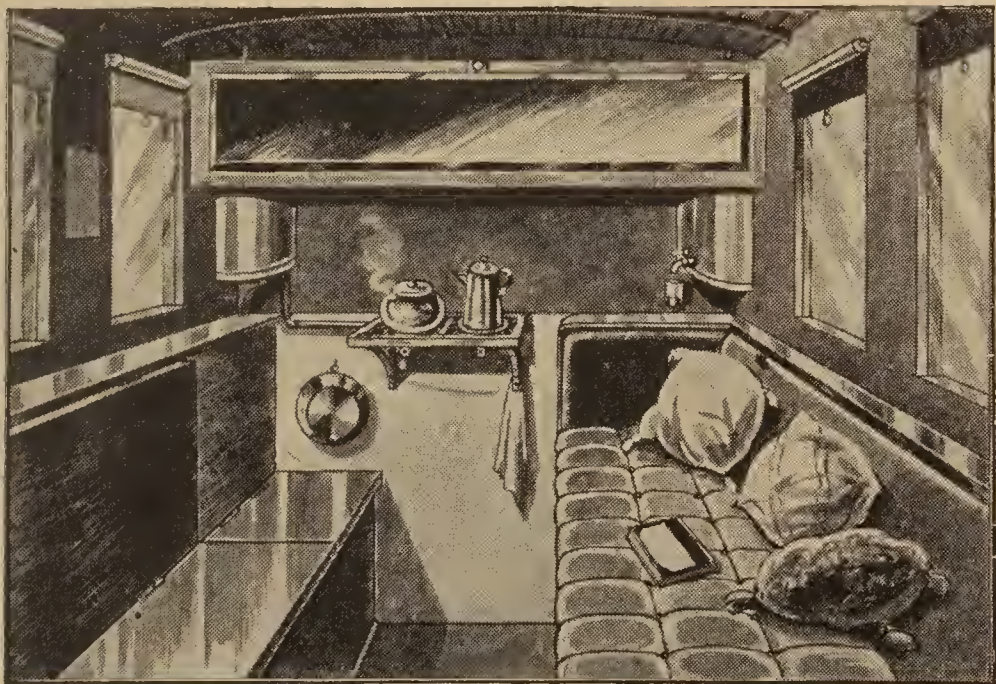
COUCH
AND BED



LOCKER

DRIVER'S SEAT

INTERIOR VIEW SHOWING
COMBINATION COUCH & BED
Fig. 6



INTERIOR OF CAR
Fig. 7

Various Views of the Exterior and Interior of an Up-to-Date "Land Yacht:" While the Interior Arrangement Is Entirely Suggestive, It will be Found Very Practical and to Afford a Maximum Amount of Space and Comfort, without Adding Too Much Weight

It might here be mentioned that the presence of a door at the rear of the car will influence the interior arrangement.

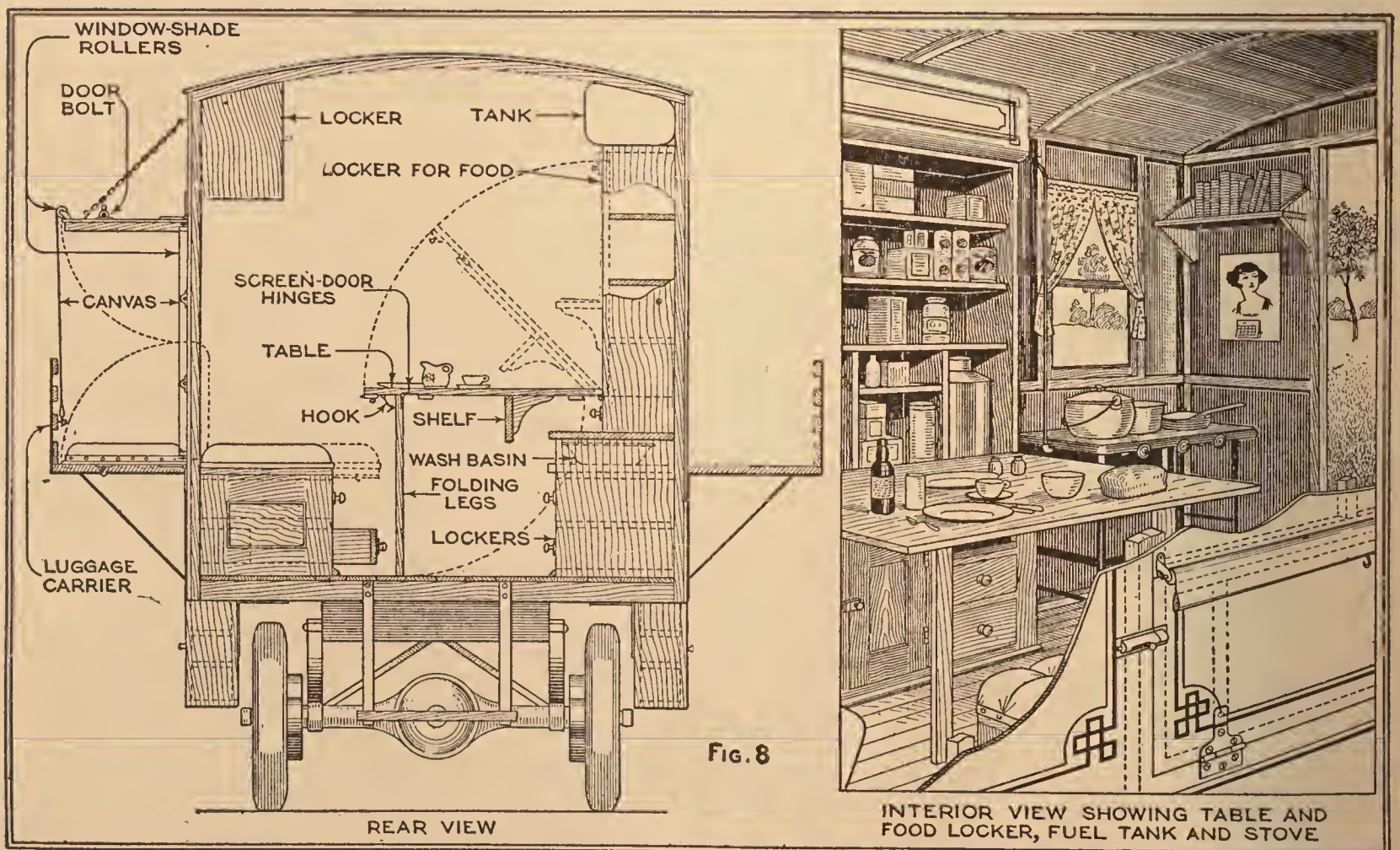
Another view of the convenient interior of this car is given in Fig. 5; this shows the combination table and cupboard, locker, and stove. When not in use, the table serves as a door for the cupboard, and is raised to the position shown by the dotted lines when in use. The locker, which extends beyond the cupboard, serves as a support for the bed when it is opened out, as shown in Fig. 6, and, like everything else, this idea will immediately suggest variations of design and arrangement. The bed may be one of those folding ones best known as a "sanitary couch," fitted with wooden ends and suitably fastened to the body.

A more complete view of the interior is shown in Fig. 7, which shows everything ship-shape, at it would be on the road, with the exception that the steaming pot on the "galley" range would perhaps be endangered by careless driving. This view shows how the oil stove is connected to the fuel tank. Also, like all the other ideas, the arrangement of the stove is susceptible of considerable elaboration, and shelves on either side of the stove would also add to the convenience.

An arrangement that furnishes a maximum of interior space and sleeping accommodations is afforded by a body of the type shown in Fig. 8. In this design, one

or both sides are hinged to open up at the center, the lower half resting upon what during the day serves as a luggage carrier. Underneath the beds, which form comfortable seats when the sides are closed, provision is made for stowing clothing and other articles. With the sides in the open position, as shown in the drawing, roller curtains are pulled down at the side and across at the ends, to obtain the necessary privacy. Naturally, such an arrangement is more suitable for use in warmer parts of the country, although by altering the sleeping arrangements slightly, it could be used with equal satisfaction in any latitude and in any season.

The interior view shows the arrangement of the "mess" and "galley," the door of the cupboard, or food locker, forming a table when not in use as a door. By placing the stove on top of a cupboard, or chest of drawers, additional storage place would be obtained with no sacrifice of space. The hinged sides of the car are held in their open and closed positions by means of chains and bolts respectively, as indicated. Of course, every spare bit of space can and should be utilized for the storage of clothing, food, and supplies, and the ingenious builder, while profiting from the suggestions illustrated in these two types, will doubtless be able to devise any number of additional comforts and conveniences that will meet the special re-



An Alternative Arrangement of the "Cruiser" Body, More Suitable for Use in Warm Climates: In This, as in the Other Design, Space is Conserved as Much as Possible

quirements of his own "crew." These designs have been stripped to the mere essentials for providing comfortable living quarters while on the road, and no attempt has been made to encumber the car with shower baths, refrigerators, or similar arrangements, the inclusion of which is

left entirely to the builder. The cost of a body such as is shown here, will, of course, vary as the interior arrangement is more or less elaborate, but for \$300 or \$400, in addition to the cost of the car, a very comfortable "auto cruiser" may be fashioned.

Casting Terminal Nuts for Storage Batteries

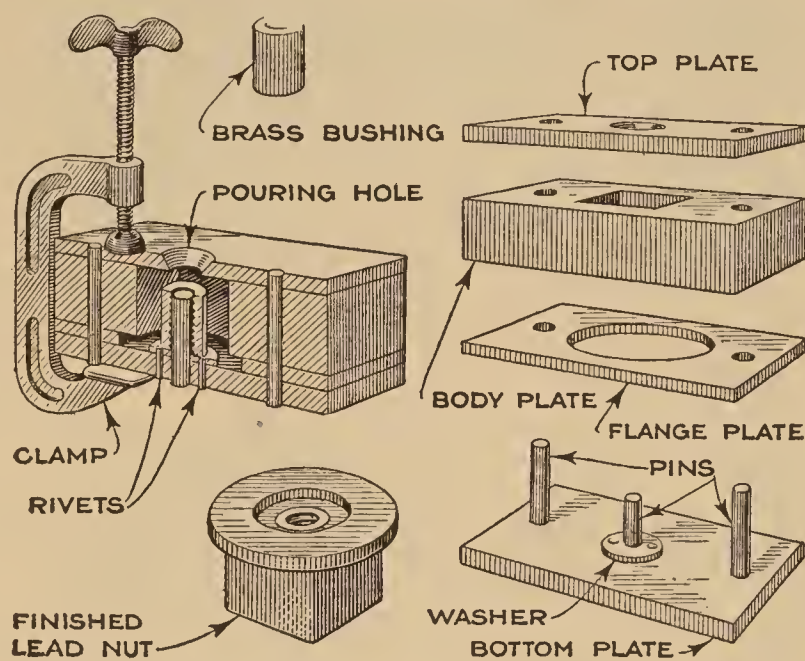
A mold for casting storage-battery terminal nuts is a convenient accessory about the garage or private lighting plant.

Such a mold can be made of hardwood, or hard fiber, if but a few nuts are to be cast, but a more substantial article is made of iron or steel plates; if brass is used, the surface must be oxidized to prevent the lead from sticking.

A top plate is first made; this to have a countersunk pouring hole, about $\frac{3}{16}$ in. in diameter. Next comes the thicker plate with a square hole, the size of the nut body; this is easily chiseled out of wood or fiber, but if metal is used, a square or triangular file must be used to form the corners after the hole has been drilled to the diameter of the flats. The square hole must be tapered slightly toward the bottom so the casting can be easily removed. Then comes the bottom plate, in the center of which is driven a pin the length of the brass bushing to be used and small enough to enter the bushing after it has been tapped. An iron washer, rusted or coated with graphite to prevent the lead from sticking to it, is placed over the pin and riveted to the bottom plate. The purpose of this washer is to form a shallow cavity in the bottom of the nut. This cavity is filled with vaseline or grease before the nut is screwed into place on the battery, to protect the brass stud and exposed end of the bushing from corrosion. After all the parts have been completed, they are assembled in their proper relationship, clamped together, and a hole is drilled in each end to take the dowel pins which are fitted into the bottom plate.

A bushing is made of round, or square, brass bar, drilled and tapped for the stud it is to fit. The outside is tinned with solder to make the lead stick to it, and to prevent it from working loose and turning inside the lead casting. When ready to use, the bushing is placed over the central pin of the bottom plate, and the mold is assembled, sheets of paper being placed between adjacent plates, and care being taken to see that the paper does not extend into the mold cavity. One or two small

clamps are used to hold the parts of the mold together, and everything is ready for pouring the melted lead. If the mold is made of metal, it should be heated before



Lost or Battered Battery Nuts may be Replaced by Using Scrap Lead in Connection with This Simple Mold

the metal is poured. The casting is easily removed from the metal mold by removing the two dowel pins and driving off the top plate edgewise, thus shearing off the "gate," but if wood or fiber is used, the top plate should be made in two parts, the dividing line being through the countersunk pouring hole.

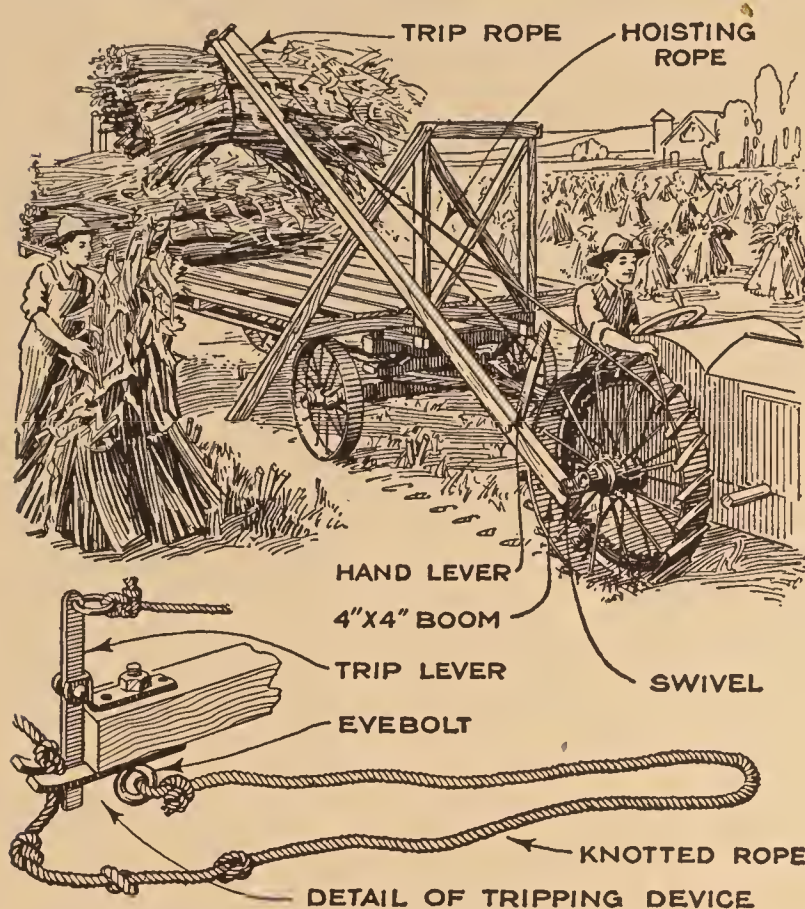
Straightening an Auto Axle

Often when an automobile will not keep to the road, it will be found that the radius rods are bent, thus allowing the axle to tip forward and throw the steering knuckles out of perpendicular. If this should be the trouble, clamp a large monkey wrench on the underside of the axle, allowing the handle to point ahead of the car. Raise the end of the handle by means of the jack and thus bend the top of the axle back into place. Each end is bent separately in the same manner, if two wrenches and jacks are not available. The axle is often bent in the manner described if the front wheels drop into a ditch while driving fast.—Harold E. Benson, Boulder, Colorado.

☐ White paint will not wear as well on exterior work as tinted or colored paints.

Using the Tractor as a Crane

A western farmer considerably reduces the labor of loading cut fodder on a wagon by making the tractor hoist the



A Simple Hoist Which Considerably Reduces the Manual Labor Required in Harvesting Corn Fodder

shocks. The only equipment necessary is a long piece of 4 by 4-in. lumber, fitted with a swivel eyebolt at one end, and a tripping device at the other; a $\frac{3}{4}$ -in. rope, 25 ft. long, and a $\frac{1}{2}$ -in. rope, 14 ft. long. The end of the 4 by 4-in. boom is attached to the hub of the tractor wheel by means of the swivel, so that it is free to move vertically and horizontally. The device shown at the outer end of the boom consists of a piece of rope, long enough to pass around a shock; this is fastened to the boom and knotted at short intervals, so that, when it is slipped between the two pieces of flat iron, the knot will prevent its pulling out. When the trip rope is pulled, the lever forces the knot out, permitting the shock to fall into the wagon. In operation, the tractor and rack are driven until the end of the boom is at the center of the shock to be lifted, the knotted rope is passed around the shock and hooked in place. The tractor operator then snubs the lifting rope around one of the mud lugs on top of the driving wheel and lets in the clutch, driving the tractor forward and lifting the load. A guide, made of 2 by 4-in. lumber, is fastened to the corner of the rack, to hold the boom out until the load is high enough, when it will swing in. The trip is then operated, and the cycle of operations repeated. This

device not only enables much heavier shocks to be handled, but can be used for a variety of other hoisting around the farm.—G. McVicker, North Bend, Neb.

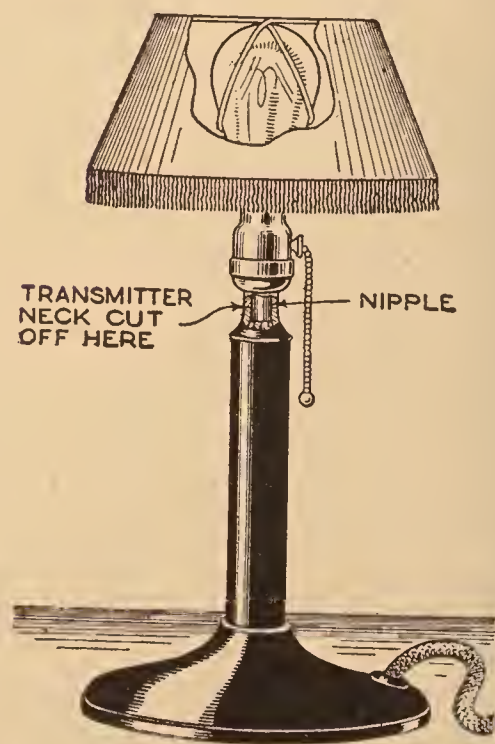
A Kerosene-Dispensing Kink

A rural resident stopping at a cross-roads general store for supplies observed with interest how the merchant had applied his ingenuity to the dispensing of kerosene. His small retail trade demanded that many a can of kerosene be filled; a greasy and disagreeable job at best when following the usual practice of drawing it through a spigot from the barrel.

To save space, and, at the same time, prevent his hands from being covered with oil, he installed a small kitchen sink, with a drain and an ordinary pitcher pump, in a corner of the store. Both the pump and drain were connected to the oil barrel in the basement below. In this way he could quickly pump up a can of oil for his customer and all drip and overflow drained back into the barrel.—T. W. Ingersoll, Buffalo, Minn.

Making a Cheap Bedroom Lamp

Almost every telephone exchange has a number of old desk-type telephones which are either obsolete or out of com-



mission, and therefore can be obtained by the amateur mechanic at little or no cost. The only part needed for making an attractive and inexpensive bedroom lamp is the base and column, as indicated in the drawing.

The transmitter neck is sawed off at the point indicated, and is tapped with a $\frac{1}{8}$ -in. pipe thread, to make a nipple, 1 in. long. A standard chain-pull-type light socket is screwed onto the nipple, and a very rigid lamp base is thus obtained.

The base may be finished to match the decorative scheme of the bedroom by giving it a coat of enamel.—A. G. Buchman, Kenosha, Wis.



A Roller Track for Canoes

BY CURTIS RALSTON

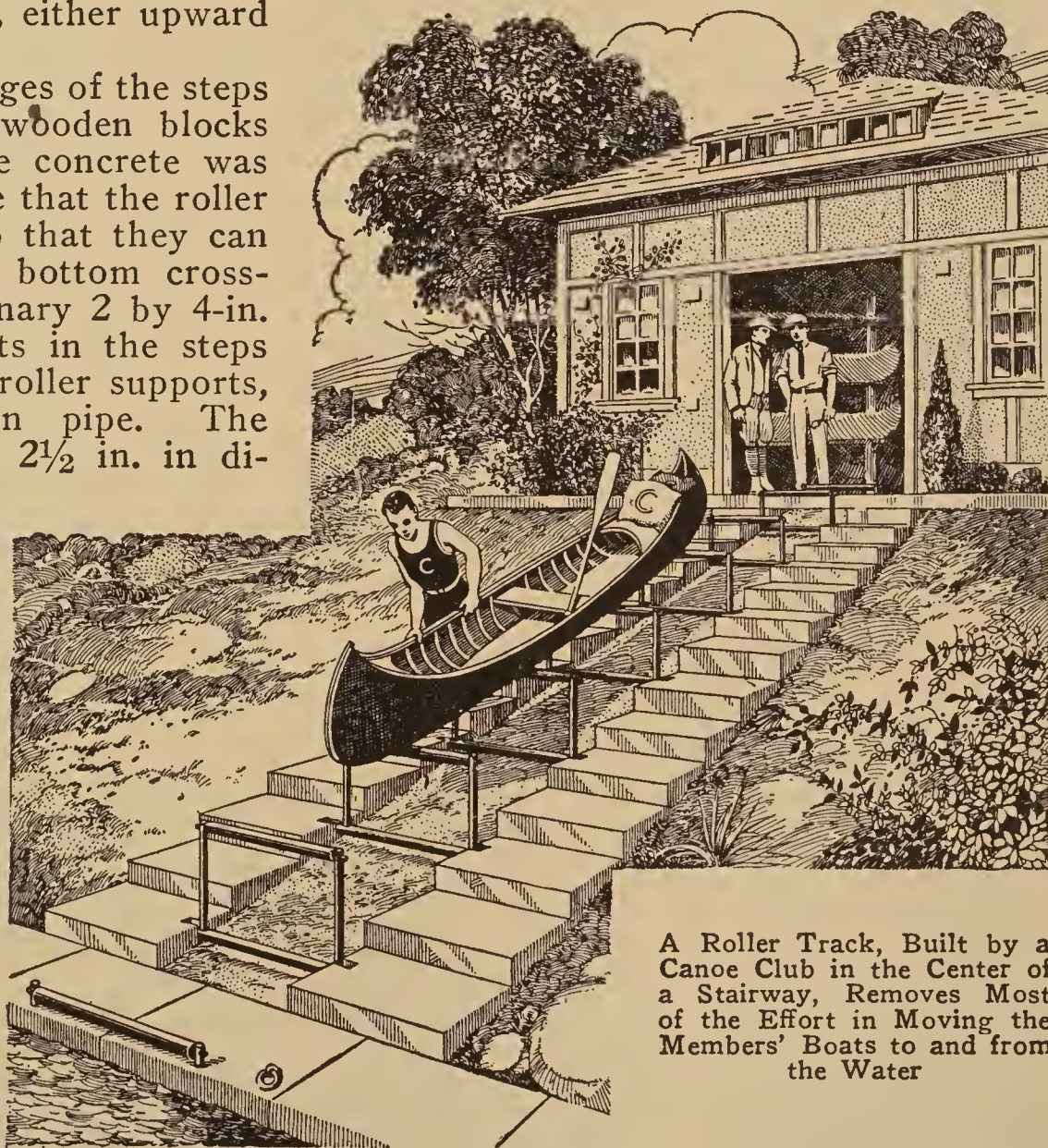
A CANOE club has built a cement stairway from its clubhouse leading down to the landing. The center of the stairway is provided with a roller track which does away with all the hard work of moving a canoe to or from the water's edge.

The rollers are set at such a height above the cement steps that it is easy for a person, walking on either side, to push the boat along the rollers, either upward or downward.

Mortises on the inner edges of the steps were made by inserting wooden blocks into the forms before the concrete was poured, and it is into these that the roller assemblies are inserted so that they can be easily removed. The bottom cross-piece, which may be ordinary 2 by 4-in. material, fits into the slots in the steps and supports the vertical roller supports, which are of 1-in. iron pipe. The wooden rollers are about $2\frac{1}{2}$ in. in diameter and are held in place with $\frac{3}{8}$ -in. axles running in holes drilled in the upper ends of the pipes. The topmost and the lowest rollers are elevated but a slight distance above the concrete work, and their supports are imbedded in the cement.

An alternative arrangement that may be used in the construction of a roller track of this kind, is to imbed the roller supports in the concrete before it has set. This method is very substantial, but, should any of the supports become broken or should their presence be undesirable, they could not be replaced or removed without considerable work. This, however, is the simplest method, and if permanence is sought, is to be preferred, particularly if the iron roller supports are made of $1\frac{1}{2}$ or 2-in. pipe. In this case it is best to cut the pipes to length and set

them into the wet concrete to the proper depth, as sawing off the pipes to length afterward involves considerable work. The entire mounting of the rollers can be done after the cement has set. After cutting the rollers to length, both ends are drilled for the axles, and holes are drilled through the pipes at the points previously marked with a punch, the axles being driven into place through the holes in the



A Roller Track, Built by a Canoe Club in the Center of a Stairway, Removes Most of the Effort in Moving the Members' Boats to and from the Water

post. By making the steps in two sections, the labor and material cost of building them the entire width is considerably reduced. The same set of forms can be used for both sections by taking them apart carefully after the concrete has hardened. The exposed surface is finished off smooth with a mixture of 1 part cement and 2 parts sand.

Tool for Skinning Fish

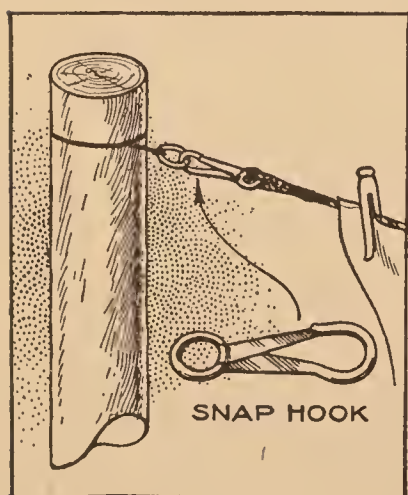
Skinning fish is a difficult and disagreeable job and scaling is also an unpleasant task, but the skinning is simplified, and scaling eliminated, by using the simple



tool shown in the drawing. This tool may be made from a piece of round hardwood, provided with a handle at one end, brads being driven through the stick so that their points project about $\frac{1}{4}$ in. The skin is slit along the back and belly, and a cut is made with the point of a sharp knife directly behind the gills. Start the skin back from behind the gills, enough to get the projecting points of the brads caught in it, then turn the stick, and the skin will be wrapped around it, until the tail is reached, when it is cut off. The opposite side is then skinned in the same manner. Should the flesh begin to tear away with the skin, scrape the knife between the two, and the skin will come away whole.—J. A. Stevens, East Boothbay, Me.

Easily Handled Clothesline

By attaching harness snaps to the ends of the clothesline and providing the posts, or other supports to which the line is at-



tached, with rings, as shown in the drawing, the line may be easily stretched and taken down without the necessity of tying and untying knots. This idea is of particular value, because, when a shower comes up suddenly, or when the

clothes have frozen to the line, one end can be loosened and both clothes and line taken into the house by rolling them into a bundle as they are taken down.

Killing Weeds with Nitric Acid

To kill weeds in a lawn and at the same time grow grass by the application of nitric acid appears contradictory to all reason, but the practicability of the method has been successfully demonstrated by a chemist who is given to agriculture in a scientific sense. All trash and litter was raked up from the area to be treated, which also served to slightly loosen the soil. A 5-per-cent solution of nitric acid and water was liberally applied by using an ordinary sprinkling can. After the acid solution had been permitted to stand for about half an hour, the treated spot was sprinkled with water from the hose; this served to drive the acid through and under the grass roots. Then the spot was sprinkled with sodium carbonate, which was scattered broadcast, and a second application of water was given to wash it into the ground and neutralize what acid was left about the roots. This treatment left the earth bare of vegetation within the limits of its application. Within a short time the grass reappeared and grew with added vigor, but the weeds were missing.

Explanation of the treatment is simple; the nitric-acid solution had at once killed everything above ground and wiped out the weed roots close to the surface, and the water carried the surplus down through the soil below the grass roots, where no harm would be done. Then the sodium carbonate, which was sprinkled on, neutralized the action of any remaining acid, and this reaction formed sodium nitrate, a common chemical fertilizer, which was washed into the grass roots by the second application of water.

Making Whitewashes

Ordinary whitewash is made by slaking 10 lb. of quicklime in 2 gal. of water. The lime is placed in a pail, the water added, and the bucket covered with a piece of old carpet, or an old bag, and allowed to stand for about an hour; the whitewash is then ready for application.

For exterior use, a weatherproof lime-wash is made by slaking 1 bu. (62 lb.) of quicklime in 15 gal. of water. A solution consisting of 2 lb. of ordinary salt and 1 lb. of zinc sulphate, dissolved in 2 gal. of boiling water, is prepared, and 2 gal. of skim milk is provided. The salt and zinc-sulphate solution is added to the lime and water, the skim milk being put in last.

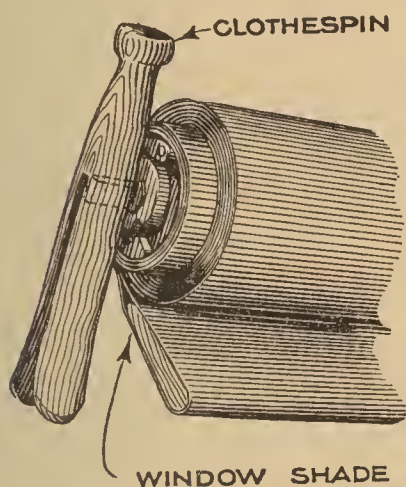
A whitewash used by the government, in the lighthouse service, is made by slak-

ing 1 bu. of lime in 12 gal. of water. In a separate container, dissolve 12 lb. of rock salt in 6 gal. of water. The salt solution is poured into the lime and water mixture, and 6 lb. of Portland cement is added and thoroughly stirred.

Alum added to whitewash will prevent it from rubbing off, the proper proportion being about 1 oz. of powdered alum to each gallon of whitewash. Molasses makes the lime more soluble, and causes it to penetrate absorbent surfaces to which it is applied. A pound of cheap bar soap dissolved in 1 gal. of boiling water and added to about 5 gal. of thick whitewash, will give it a gloss.

Clothespin Makes Shade-Roller Wrench

When the spring in a window-shade roller becomes loose, it is rather hard on the fingers to attempt to tighten it without a tool. In such a case, a common clothespin makes a practical wrench, and one always available. As shown in the drawing, the cleft in the clothespin is placed over the ratchet end, and the pin is rotated until the spring is rewound to the proper tension, and the ratchet set.



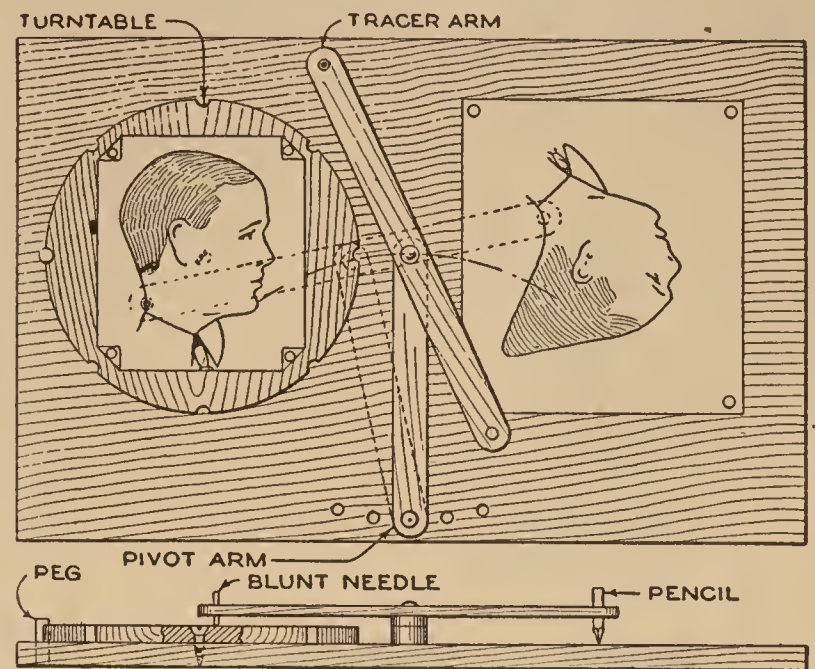
spring is rewound to the proper tension, and the ratchet set.

A Caricature Pantograph

A simple little device that will afford endless amusement to the youngsters, and to the elders also, is the caricature pantograph illustrated.

For the base, a piece of soft wood, about 18 in. square, is selected. The tracer and pivot arms may also be of soft wood, and should be about 10 in. long. The turntable should be laid out on a piece of thin soft wood, and eight equidistant holes, about $\frac{1}{4}$ in. in diameter, drilled around the line marking the circumference. The table is then cut out, leaving eight semicircular notches on the periphery, as shown. The turntable being mounted on the base with a flat-head screw, countersunk flush, a $\frac{1}{4}$ -in. hole is drilled in the base, in line with one of the notches in the table, and a peg fitted. This holds the table firmly. At the front of the baseboard, five holes are drilled to fit the pin on which the pivot arm swings. These holes are laid out on a 10-in. arc.

Before screwing down the pivot arm, place one or two small washers between it and the tracer arm, and between pivot



Very Ludicrous and Mirth-Provoking Pictures are Made With the Simple Pantograph Illustrated. Try It on a Profile Picture of One of Your Friends

arm and base, so that the tracer arm will be about $\frac{1}{2}$ in. above the turntable.

Tack a profile, or silhouette picture, to the turntable, and a sheet of blank paper to the other end of the base. Trace the profile by means of the blunt needle; a comical picture will be produced by the pencil on the other end of the tracer arm.

It is possible to obtain five different pictures from one copy by merely moving the pivot successively from one of the holes in the base to another, while, by removing the peg, turning the table until another notch registers with the hole, and reinserting the peg, many other transformations are produced.

A Handy Lap Table

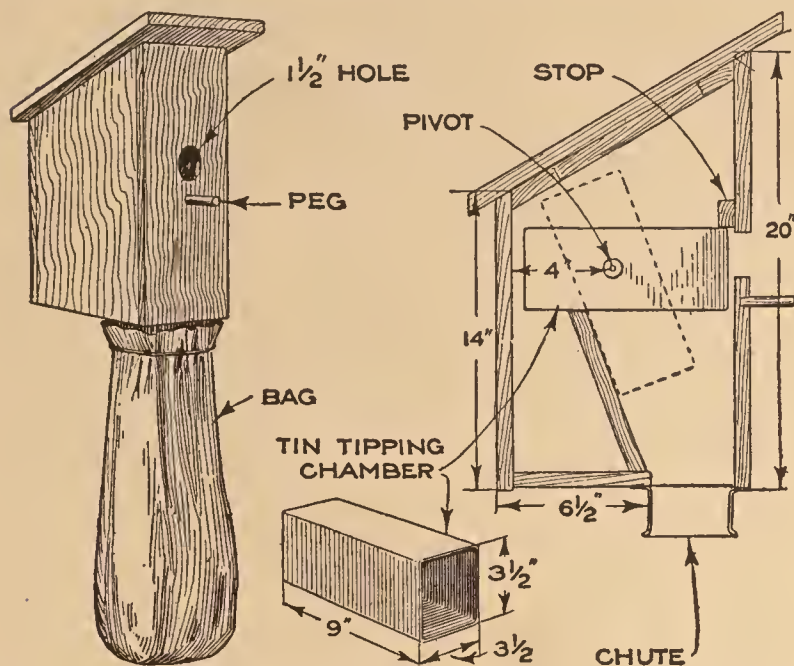
A table that can be supported on the lap is particularly desirable for seamstresses and, under some circumstances, for camping and other purposes. The table may be made from light lumber, or heavy wallboard, with a semicircle cut from one edge to fit against the body as shown. A setscrew is attached to the rear of the board for holding a supporting leg of heavy wire, as indicated in the drawing.—A. B. Smith, Santa Fe, N. M.



Nest-Box Trap for Sparrows

Since the introduction of the English sparrow, or, as it should be more properly called, the house sparrow, the country has been trying to get rid of it.

The drawing shows an efficient nest-box trap for catching the feathered pests as



A Nest-Box Trap That Catches Sparrows as Fast as They Come Along in Search of a Nesting Place: The Bag may Easily be Removed and the Birds Destroyed

they come along in search of nesting quarters. The principal parts of the trap are a box with a tipping chamber inside, a spout underneath, and a bag into which the sparrows are precipitated. The tipping chamber is made of tin, closed at the rear and pivoted near the center, so that it will tip over easily. A few feathers and bits of straw can be fastened to the rear of the trap to attract the curiosity of the birds and to hasten their entrance.

Poison offers another effective means for reducing the sparrow population. For this purpose strychnine is used, as it is easy to prepare and acts quickly. Wheat, or any other grain or seed readily eaten by the sparrows, can be used for bait. The bait is poisoned by putting $\frac{1}{8}$ oz. of strychnine into $\frac{3}{4}$ of a gill of hot water, adding $1\frac{1}{2}$ teaspoonfuls of starch or wheat flour, moistened with a few drops of cold water. The mixture is then heated, stirring constantly until it thickens. The hot starch is poured over 1 qt. of grain and stirred until every kernel bears a coating. Only as much of the poison should be put out as is likely to be eaten in one day, since exposure to moisture reduces its effectiveness. One will naturally be guided in the use of such bait by the existence of laws or ordinances prohibiting such practice, and the likelihood of other birds and fowls being poisoned by it.

Blowtorch Cleans Typewriter

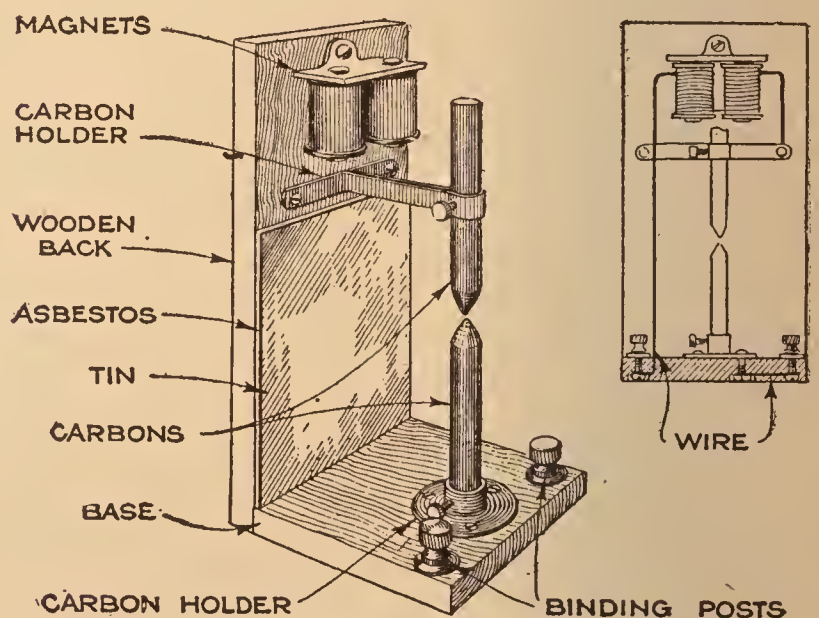
A novel method of cleaning a typewriter and reaching the parts that, on many models, are practically beyond reach by other means, makes use of a fine stream of gasoline under pressure from an ordinary hand blowtorch.

The tank of the torch is one-quarter filled with gasoline, benzine, or denatured alcohol, and the maximum pressure pumped up. After the pressure has been raised to the desired degree, the valve is opened just enough to produce a small but strong stream of the fluid. The force of the stream is sufficient to dislodge particles of grit and gummed oil. The machine may be placed on several thicknesses of newspaper to absorb the fluid that drips through. Care should be taken to perform this work away from all lights and fires, and if possible, in the open air.

A Low-Voltage Arc Lamp

An arc lamp that can be used for experimental and practical purposes can be made by the amateur electrician at slight cost in money and time.

Build a stand of wood after the style illustrated, so that the back will be about 15 in. high and the base 6 in. long, the width of both to be about 6 in. Obtain a pair of good-sized magnets from an old bell, and remove the small-gauge wire with which they are wound, substituting



A Simple Arc Lamp That can be Built in the Experimenter's Workshop to Operate on a 30-Volt Current Furnished by Dry Cells

for it the regular No. 18 gauge bell wire, and making sure that this is wound onto the cores in the same direction as the original winding. After rewinding the magnets, they are attached to the top of the rack by the iron yoke that holds the cores together. Just below the magnets,

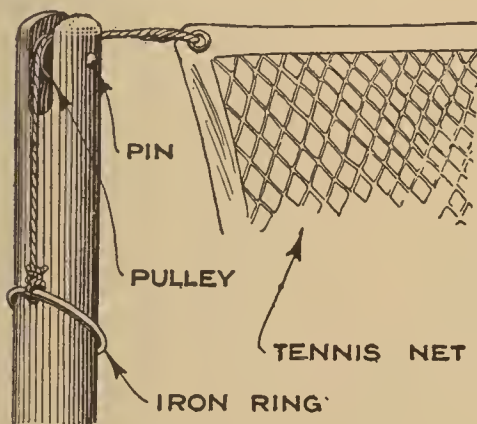
fasten one of the carbon holders to the back, carefully insulating it from the wood. This holder is made from a strip of brass, bent to hold the carbon and provided with a thumbscrew. Directly below this holder a socket is provided for the lower carbon. Make this part from a section of brass tubing set into a fiber washer. A setscrew should also be provided in this for holding the carbon rigid.

The wooden back is insulated with a piece of sheet asbestos, and this is in turn covered with a sheet of tin, which serves as an additional protection for the back and also as a reflector.

Wire one pole of the magnets to the upper carbon holder and the second to a binding post on the base. The bottom carbon holder is connected to a second binding post. Connect this arc lamp to a battery of about 15 dry cells, or other source from which approximately 30 volts can be obtained. Adjust the distance between the carbons until a position is obtained at which the arc will be strongest. As the carbons burn away they must be readjusted manually.—L. B. Robbins, Claremont, Calif.

Adjustable Fastener for Tennis Nets

The drawing shows an adjustable fastener for tennis nets, by means of which the net can be kept stretched taut without the need of tying knots.



Two iron rings, slightly larger than the post, are obtained and tied to the net ropes, as they are not removed when it is taken down.

All that is necessary to tighten the net, is to place the rope over the top of the post and press down on the ring with both hands. If a small pulley is set into the top of the post, as shown, the net can be tightened much easier.—Elmer O. Tetzlaff, Milwaukee, Wis.

Aids for the Blind

An ingenious blind man, finding a cane insufficient to enable him to walk rapidly, had the two aids shown in the illustration made for himself. One consists of two small wheels from a baby carriage which are attached to a handle; the other

is a bent iron hook, which may be made as illustrated or cut shorter and set in a long wooden handle or in the end of a cane.

With the hook to guide him along the curb, and the wheel arrangement to prevent running into obstructions or pedestrians before him, this blind man was able to walk with amazing speed con-



Two Novel Devices Used by a Blind Man by Means of Which He can Walk Rapidly and at Minimum Risk of Running into Obstructions or Pedestrians before Him

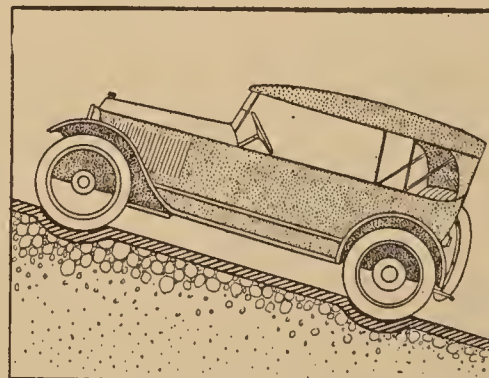
sidering his affliction. Any blacksmith will make the hook for a few cents, and the cost of the wheel device will be so small as to be negligible.—Frank Harazim, New York, New York.

Depressions in Inclined Drive Prevent Auto from Backing

The owner of a residence on a hilly site was compelled to build a driveway to his garage at a decided angle. While the drive was under construction, de-

pressions, slightly wider than the wheel, were made in the concrete at intervals, as indicated in the drawing, so that, should the engine stall or some part refuse to hold, the danger of the car's running backward for any distance would be greatly minimized.

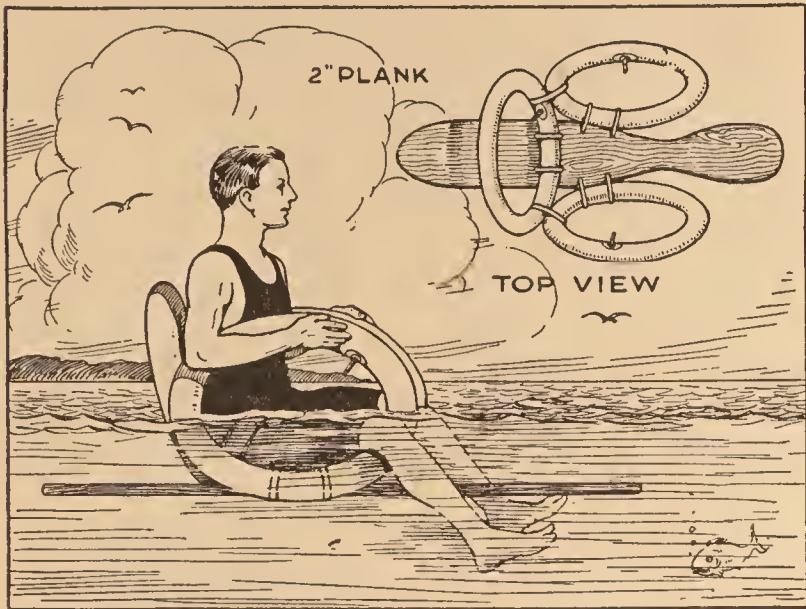
—Dale R. Van Horn, Lincoln, Neb.



Ordinary asphaltum varnish, obtainable at all paint stores, is one of the best paints for door and window screens, to prevent them from rusting.

A Novel Armchair

Few think it possible to lie back and take it easy in a morris chair in six feet



A Novelty in Armchairs for Use on the Water Permits the Bather to Sit at His Ease without Exerting Himself to Keep Afloat

of water, yet, with a chair of the style shown in the drawing, it can be done with ease and comfort.

A cedar, or soft-pine, board, about 1 ft. wide and 6 ft. long, is formed as indicated, so that the narrow part will be about one-third of the total length from the front. The board is then rubbed down smooth and given one or two coats of paint. Two inner tubes, about 30 by 3 in., are lashed to the sides with straps passed through slots cut in the board, taking care not to draw the straps too tight, but just enough so that the tubes can be inflated to nearly full capacity. A third tube is lashed across the back between those at the sides.

The tubes are pumped up so that they will hold their shape well, and the chair is ready to be launched. By leaning against the back tube and holding those at the sides like the arms of a chair, one can tilt back as comfortably as though in the sitting room at home. Proper balance will soon be attained by shifting the weight of the body back or forth as occasion may demand.

A Chemical Dandelion Eradicator

Dandelions can be eradicated from a lawn by the simple method of spraying or sprinkling with an iron-sulphate solution, instead of digging them out with a knife. Besides, the weeds will not return, as they will in most cases when a part of the root remains in the ground, as it generally does when cut. While the solution referred to is particularly valuable for destroying dandelions, it will also de-

stroy some other types of weeds and, unfortunately, white clover as well, so if there is both white clover and dandelions in the lawn, it is a question of which is the most desirable—to kill both, or to keep both. However, the solution is harmless to grass.

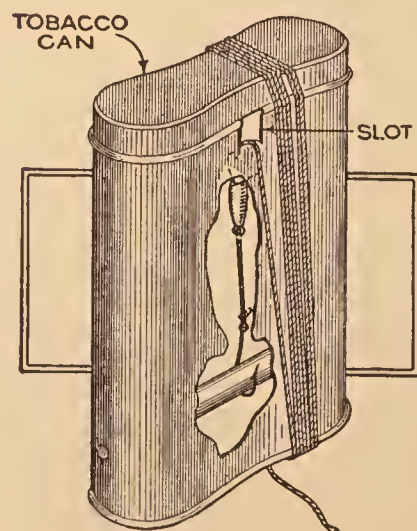
Iron sulphate is inexpensive and can be obtained through most seed dealers. One and a half pounds of the chemical are dissolved in a gallon of water, and the solution is applied with a spray or sprinkling can, preferably the former, as it has been found from experience that the more thoroughly the solution is driven onto the leaves and stems, the better.

The first application should be made in the spring, just before the dandelions have had an opportunity to bloom. This application should be followed by a second, third, or even a fourth, at three or four-week intervals. One or two applications can be given late enough in the fall to prevent growth before the end of the season.

Properly applied, the solution will cover about 375 sq. ft., and should not be allowed to come into contact with stone or concrete work, as it will cause unsightly, rustlike stains. Also, the iron-sulphate solution should not be used in hot, dry weather, as considerable damage may be done to the then comparatively inactive grass.

Tobacco-Tin Tackle Box

To prevent the hook from catching in the clothing and his line from becoming snarled, the young angler will find that an



ordinary tobacco tin makes an effective tackle box for his limited equipment. A small slot is cut in the edge of the can, and the resulting tongue is bent over to prevent cutting the line. The hook, sinker, and float, if the latter is not too large, is placed inside the can, and

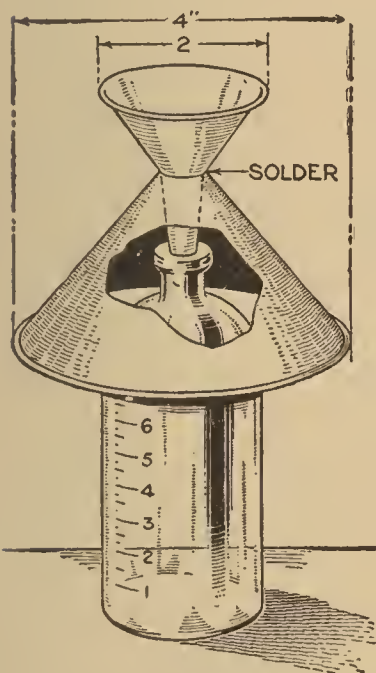
the line is wound around the outside in the manner shown, to prevent it from becoming knotted and tangled. If desired, a small wooden rod may be placed inside the tin, as indicated, to hold the hook, the rod being held firmly by a couple of tacks driven through the tin.—John S. LaFleur, Haverhill, Mass.

A Compact Pastry "Board"

A piece of white oilcloth, about 24 in. square, makes a compact pastry board for the cook of the kitchenette. A 1-in. hem is stitched around the oilcloth square and a strip of tape is sewed across the center so that it will not break when folded. For rolling pastry or doing anything for which the old-fashioned bread board was used, the oilcloth is fastened to the table with brass thumbtacks; after it has been used and washed off, it is folded in the center and wrapped around the rolling pin, to which it is fastened with two of the thumbtacks, the other two being stuck into the end of the pin.—Mrs. Jennie E. McCoy, Philadelphia, Pa.

A Simple Rain Gauge

A rain gauge, by which one can ascertain with fair accuracy the precipitation over a certain period, is made from a graduated bottle and two tin funnels. The



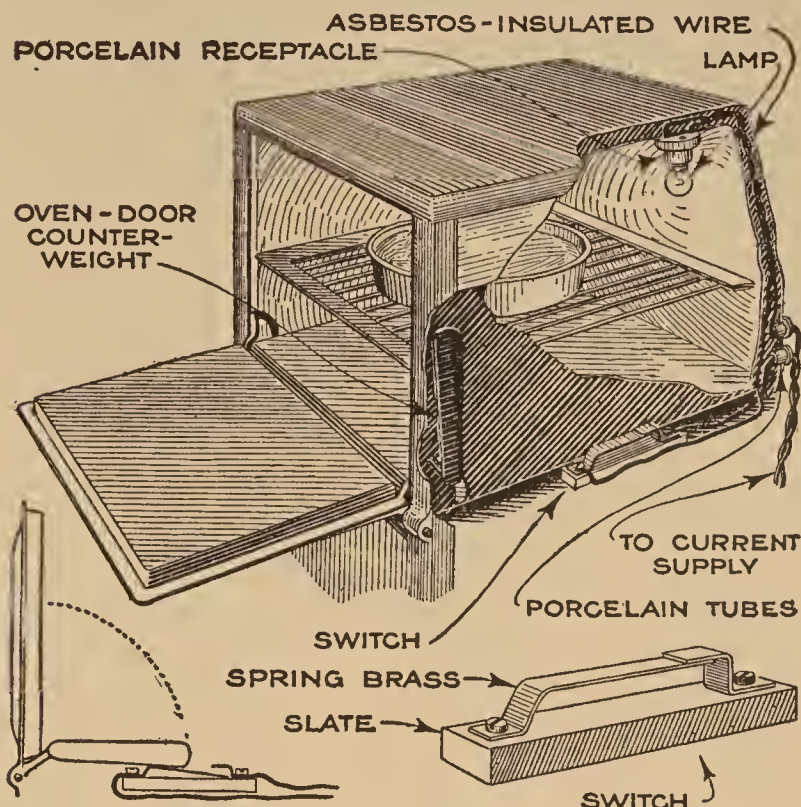
spout of the larger funnel is removed and that of the smaller one is inserted into the opening and soldered, as indicated. The spout of the smaller funnel is placed in the neck of the bottle. In order to determine the amount of precipitation, the bottle must be graduated in fractions of an inch, and this may be done by

marking the bottle with a file, or by making a scale on paper and gluing it to the glass, afterward coating it over with varnish. In use, the gauge should be set in the open.—T. C. Dyer, Collinsville, Conn.

Illuminating the Stove Oven

A small electric lamp inside the oven of the ordinary kitchen range, so arranged that it is automatically turned on and off with the opening and closing of the oven door, will be welcomed by the user. A porcelain lamp receptacle is bolted to the interior of the oven so that the lamp will not interfere with the insertion of dishes and pans. The drawing shows how the light is operated on ranges equipped with

a counterweighted door. All the wires used in an installation of this character must be asbestos-covered, and care should



An Electric Lamp Installed inside the Range Oven is Lighted and Extinguished by the Opening and Closing of the Oven Door

be taken to have all parts so insulated, or concealed, that there will be no liability of shock if current from the lighting circuit is used. However, for all practical purposes, a miniature lamp operated by two or three dry cells will give sufficient illumination, and is to be preferred.—Kenneth Coggeshall, Webster Groves, Mo.

A Simple Bench

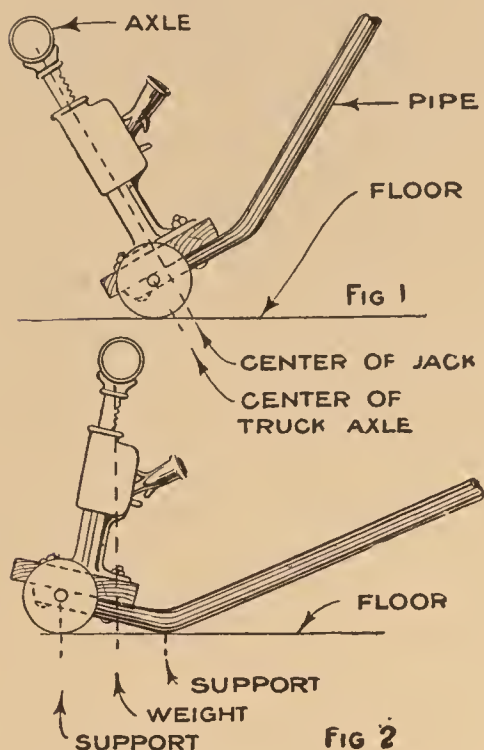
A bench, substantial enough to hold a machine vise, and of sufficient strength to stand the rough usage incident to this duty, is a necessity around the farm or home workshop.



A very simple and cheap bench is shown in the illustration; it consists of a stout barrel, in the center of which is set a heavy post, firmly packed with gravel. A board of the desired dimensions is fastened to the post top, and the vise is mounted thereon. A bench of this character does not occupy much space, and is unusually well suited for this purpose.—A. W. Andrews, Long Island, N. Y.

A Wheel Jack for the Private Garage

Applying chains to the car before leaving the garage is often neglected because of the inconvenience of jacking up the

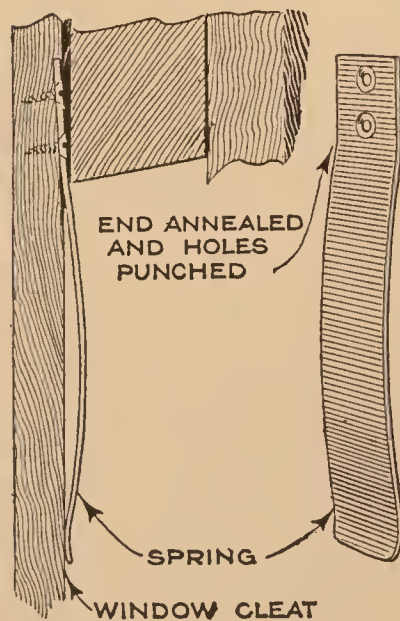


car, and the possibility of soiling one's clothes. The wheel jack shown in the drawing will make this operation simplicity itself. The jack is bolted to a wooden block, and this in turn is attached to a pair of small iron wheels, as indicated, and to a substantial handle, to gain leverage. To

raise the wheel from the floor, wheel the jack into position so that it engages the axle, as in Fig. 1, then bear down on the handle until the bent portion touches the floor, as in Fig. 2. The weight of the car will then fall between the axle of the truck and the bend of the handle, providing a solid and stationary support for all practical purposes. After the jack has once been adjusted to the axle height of the car it will not be necessary to change it, if always used for the same car.—G. E. Hendrickson, Argyle, Wis.

A Silencer for Rattling Windows

Winds can blow in vain without rattling the windows of a house equipped with the antirattler shown in the drawing. A piece of flat spring steel, $\frac{1}{4}$ in., or more, wide and about $2\frac{1}{2}$ in. long, is annealed at one end and punched, after which the strip is bent as shown.



The springs are screwed to the window frame with small flat-head wood screws, so that there will

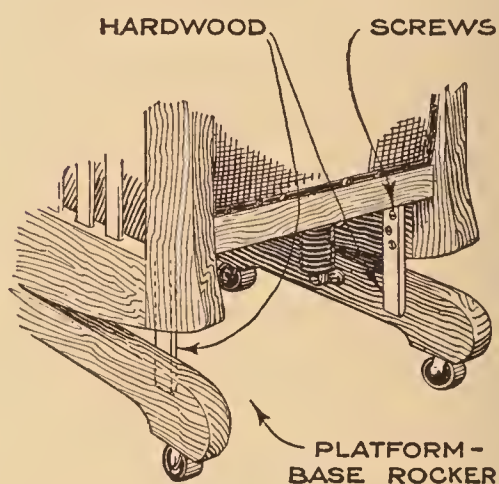
be no play between the sash and frame of the window that is responsible for the rattle.—Carl H. Spatz, Nutley, N. J.

Hooks Hold Dry Measures

A simple device for holding dry measures when filling, consists of a hook permanently fastened to the top of the measure. A U-shaped hook of flat iron is made with one end a trifle longer than the other. The long end is drilled with two holes, so that it can be fastened to the measure with screws, bolts, or rivets, as may be desirable. In use, the measure is hooked over the container instead of being placed on the floor or held between the knees, thus eliminating the necessity of bending, and permitting the free use of both hands.

Guide for Platform Rocker

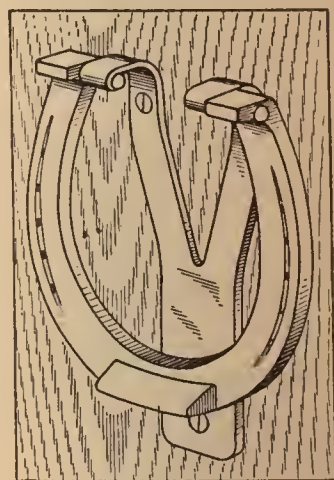
To prevent the rockers of a platform-base chair from working out of line with the base and upsetting the occupant, guides can be attached, as shown in the

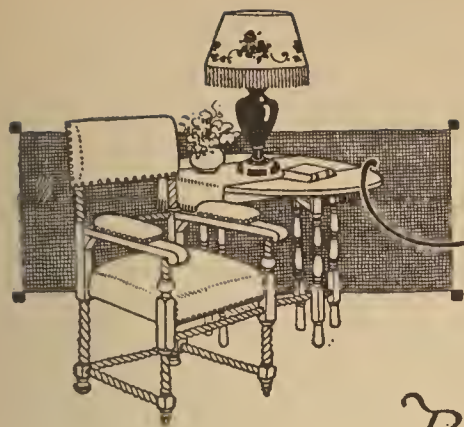


drawing. A strip of hardwood, about $\frac{3}{4}$ by 2 in., and of a suitable length, is screwed to each rocker; the strips are beveled off on the edges, to make a neat appearance, and are placed sufficiently back from the end so that they will always bear against the sides of the base when the chair is in use.—Roy E. Kingsley, Melrose, Mass.

A Horseshoe Door Knocker

A neat and effective door knocker may be made from a small-sized horseshoe. A bracket is made of $1\frac{1}{2}$ -in. flat stock, which is split, and the ears forged, as shown, to take the pins carrying the horseshoe. The heel calks are drilled to correspond with the ears on the bracket, the pins inserted, and heads formed on them. If desired, a round-head rivet may be driven into the bracket for the horseshoe toe to strike against, although this is not essential.—C. C. Spreen, Warren, Ohio.





MAKING READING-LAMP BASES

By Edw. Atkinson

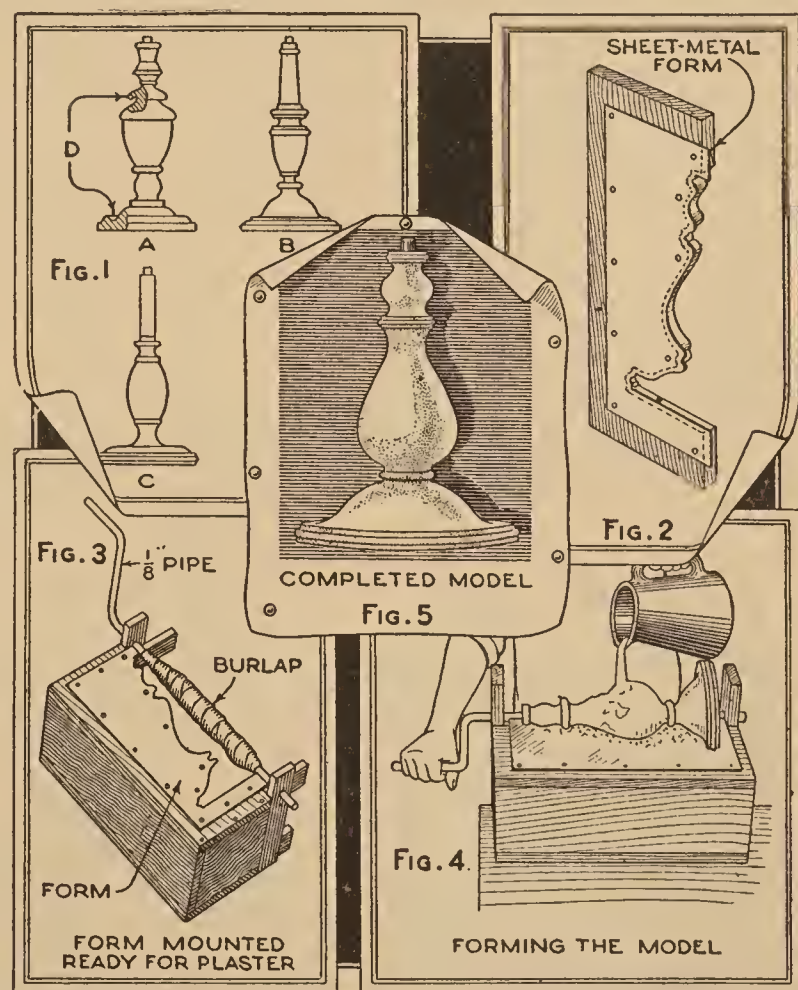
NO home is now considered complete without its reading lamp, the soft, shaded light of which is not only restful to the eyes, but introduces a note of cozy comfort in the simplest surroundings. Many more people would use these lamps were it not for their comparatively high cost. With a little care, however, lamp bases may be made from plaster of Paris or cement, which, when finished and fitted with an appropriate shade, can barely be distinguished from the most expensive wooden ones.

Obtain a piece of sheet metal, galvanized iron being perhaps the best, about 2 in. longer than the desired height of the lamp base, and 1 or 2 in. wider than its greatest radius. Choose a design like B or C, Fig. 1, or like Fig. 5, and avoid a design that is undercut, as shown at D, Fig. 1; undercut parts in the design make it impossible to withdraw a simple sheet-metal form, when making the original, or to extract the piece from the mold, when making duplicates.

One edge of the sheet metal is trued up, and half of the design laid out on the surface of the metal, using the trued edge as the center line. The design is then cut out with shears and chisel, and finished with fine half-round files; the form is next placed on a piece of board, $\frac{3}{4}$ in. thick, and the outline transferred to the wood, which is cut out somewhat larger than the design. Tack the metal to the wood as shown in Fig. 2, allowing it to project over the wood about $\frac{1}{8}$ in.; this backs up the metal, while leaving a sharp edge. The next operation consists in nailing the form, with its wooden backing, to a stout box, as shown in Fig. 3; the box must be deeper than the largest diameter of the finished base. Two supports are nailed to the ends of the box, as illustrated, the supports being drilled for a piece of $\frac{1}{8}$ -in. pipe, the center of which must be level with the top edge of the form and about 1 in. distant from it. One end of the pipe is bent, as illustrated, to form a handle. Everything is now ready for making the original.

Mix the plaster or cement with water to a thick cream. Obtain a square piece

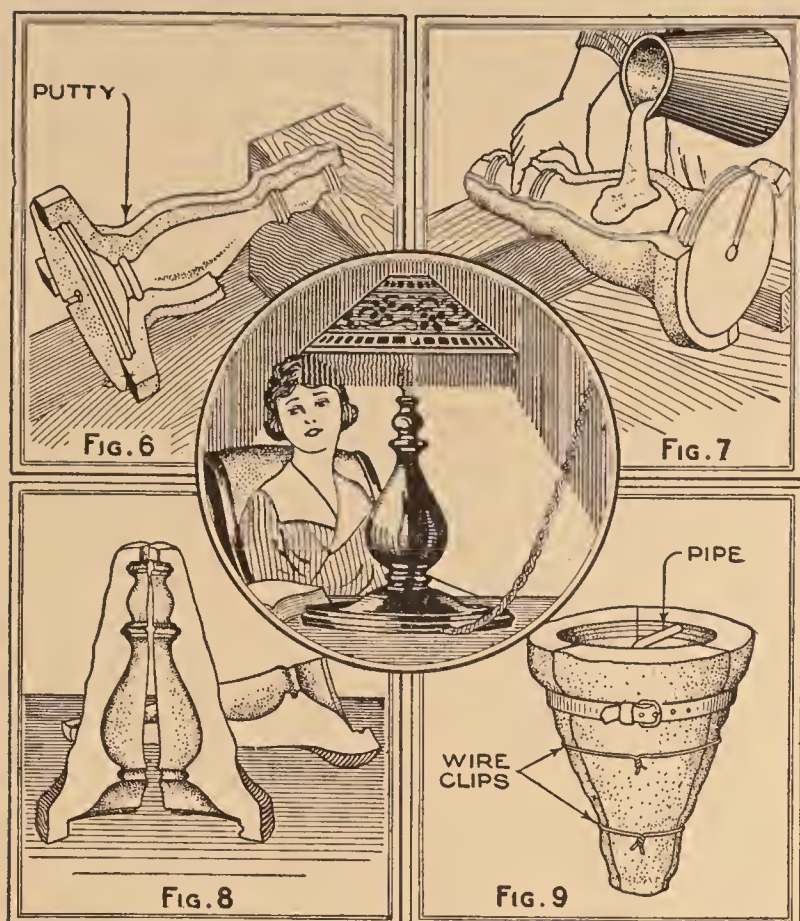
of burlap, 1 in. shorter than the length of the design, and dip it in the plaster until it has taken up as much as possible, then wrap it around the pipe, as shown in Fig. 3, securing it with one or two pieces of string if necessary. The burlap provides a foundation for the plaster when pouring is started and also strengthens the model somewhat. Commence turning the pipe, while pouring the plaster over the burlap; the form will shave off the excess plaster, until the piece at last takes shape; this operation is shown in Fig. 4. If the plaster sets too quickly, add a little glue size to the water when mixing. If only



The Various Steps Necessary in Making Plaster Lamp Bases are Here Shown in Detail. Few Materials, and These of the Simplest, Are Necessary; If Many Bases are to be Made, It Is Best to Construct a Mold. This is Readily Done, and the Casting of the Bases is Then Very Easily Performed

one base is required, this piece may now be set aside to harden. When it is perfectly hard, cut off the projecting ends of the pipe, at top and bottom, leaving enough at the top to cut a thread on, so that a lamp socket, or a two-light bracket, may be screwed onto it. A groove may

be cut across the bottom, as shown in Fig. 7, to lead in the wires, a circular piece of felt being then glued on, to hold them,



The Mold is Built Up on the Model Made as Shown in the First Illustration, Further Bases being Cast in the Mold

and to prevent the base from marring the furniture.

If more than one base is required, the first one may be used as a model, and a mold made from it, in which any number of bases may be cast.

Shellac the model and support it as shown in Fig. 6; build a dam, or wall, of putty along the longitudinal axis, the

dam being about 1 in. high and rather irregular on the sides. One-third of the way around the base, build a similar dam, then fill the space between with plaster or cement, first, however, coating both dams and the exposed surface of the model with olive oil, or any similar lubricant. When this plaster coating has set, strip off one putty dam and build it up again as illustrated in Fig. 7. Oil the exposed edge of the first plaster coat, the model surface, and the dam, and again pour on cement or plaster. When this in its turn has set, strip off both dams, oil, and pour the remaining third of the mold. When completed, and parted from the model, the three pieces of the mold will appear as in Fig. 8, each piece being an exact replica, in reverse, of one-third of the model surface, and, when assembled, as in Fig. 9, forming a complete mold.

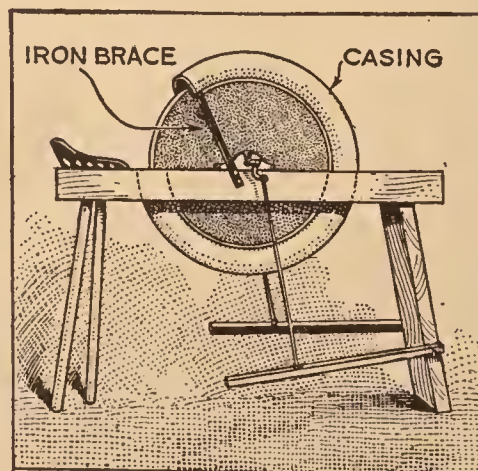
Making duplicate bases is simplicity itself. A piece of $\frac{1}{8}$ -in. pipe is bent at right angles and inserted into the mold, as shown, one leg of the pipe being long enough to pass through the bottom of the mold and the shorter leg just touching the edge. Oil the mold, and pour in the cement; when this has set, remove the mold. The plaster or cement can readily be stained to match the furniture, first filling in any small blowholes which may be observable, with a fairly thick paste of the material used for the piece. A good finish can be secured by using wood dye and then applying one or two coats of good varnish. The shade is readily obtainable at any department store.

Window Display Uses Spark Coil

An ordinary vibrating-type induction coil, such as is used on light automobiles, can be combined with a set of batteries and a piece of glass to make an attention-compelling electric window sign. The name of the product, or other message, is painted on the sheet of glass with shellac, preferably in script, so that all the letters will be connected together. While the shellac is still sticky it is dusted with fine brass filings. When the induction coil is connected in the circuit with the metallic letters, the current will pass through the characters in a blue sheet as the spark jumps from one minute particle of metal to another. Such a sign can be changed as often as desired by removing the shellac with wood alcohol. A circuit interrupter, or other means for applying the current intermittently, will prolong the life of the batteries and contact points.

Grindstone Pan Made from Old Tire

The water pan of our grindstone became so badly rusted that it was worthless for the purpose intended, and while casting about for a substitute, the idea of



using an old automobile tire, as shown in the drawing, occurred. The upper end of the tire is supported by a brace made of flat iron. The result was not only a satisfactory water pan but a shield that prevented excessive splashing, thus contributing considerably to the comfort of the user.

using an old automobile tire, as shown in the drawing, occurred. The upper end of the tire is supported by a brace made of flat iron. The result was not only a

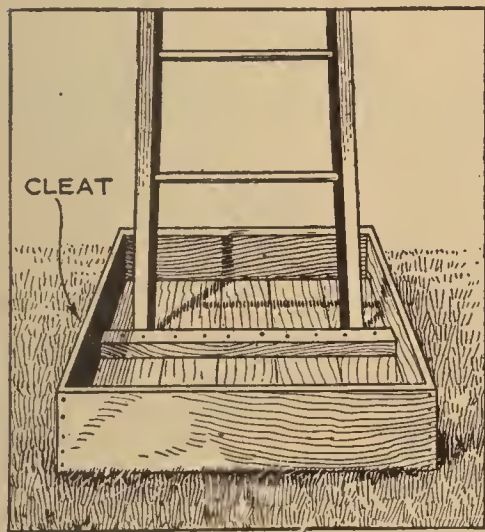
Blue Spots on Sepia Prints

Photographic prints that are "toned sepia" by the redeveloping method, frequently come out of the solution marked with small blue spots. This is due to the use of impure potassium ferricyanide in the bleaching solution. The impure chemical contains small particles of iron in a more or less free state. The spots may also be caused by using enameled trays, from which the enamel has chipped enough to expose the iron base. Naturally, by using chemically pure ferricyanide and avoiding iron trays, the spots will be avoided.

Sodium sulphide, if allowed to grow old while exposed to the air, will give yellowish-brown tones rather than the desired sepia.—A. C. Cole, Chicago, Ill.

Protecting the Lawn When Using Ladders

Roofers and painters, who must use ladders, know how often complaints are heard about the marks their ladders have



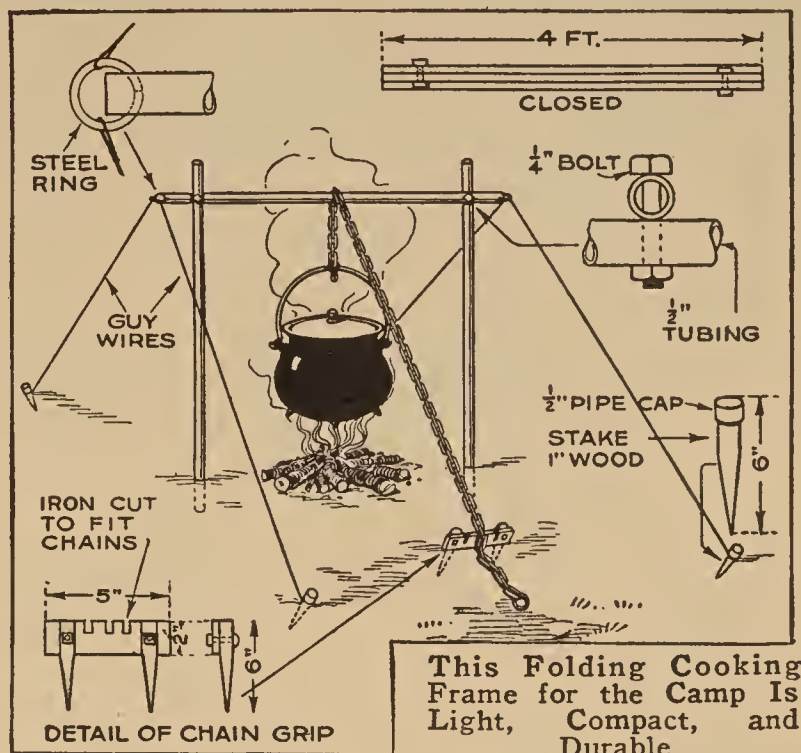
made in lawns and flower-beds. All such damage can be avoided by setting the ladder in a shallow box, as shown in the drawing. The box should be slightly wider than the lower end of the

ladder, and a cleat across the bottom, on the inside, will furnish all the support necessary for the ladder. The box also is highly desirable for furnishing a firm support in soft soil.—R. F. Hamill, Elkins, West Virginia.

A Cooking Frame for the Camp

Three pieces of pipe or tubing are required for this simple cooking arrangement for the camp. The upright pieces of tubing, which are inserted into the ground, are bolted to the crosspiece about 3 in. from each end, and on opposite sides, as shown, so that the whole may be folded up. The horizontal crosspiece is drilled about 1 in. from each end, and a metal ring is inserted for attaching the guy wires. Similar rings are attached to the

outer ends of the guy wires, through which a stake may be driven. The cooking utensils are suspended from the cross-



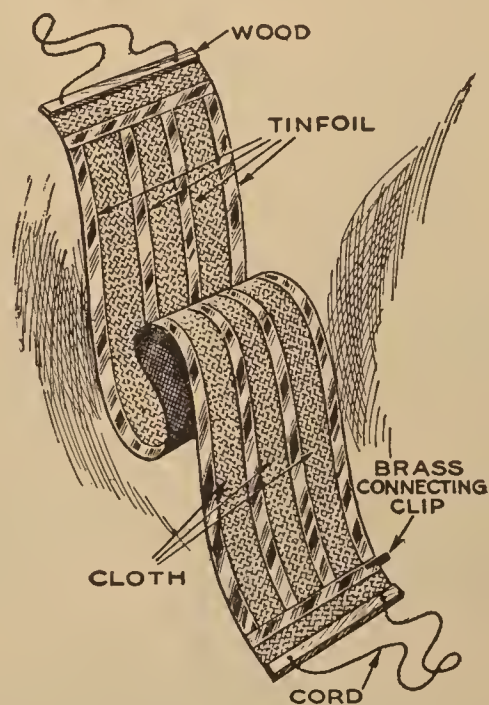
piece, with pieces of sash chain provided with a hook at one end. A notched block, with short stakes at each end as shown, serves for a chain grip. In this manner several containers may be suspended over the fire at the same time.—Clifford M. Lawrence, Philadelphia, Pa.

A Compact Indoor Aerial

An indoor aerial that can be rolled up and stowed away, and that will give excellent results, is made from a length of cloth and some tinfoil strips.

A piece of some light-weight cloth, about 10 in. wide and 15½ ft. long, is glued to a wooden stretcher at each end. Four tinfoil strips, ½ in. wide and 15 ft. long, are attached to the fabric with glue as shown, and connected at each end by cross strips.

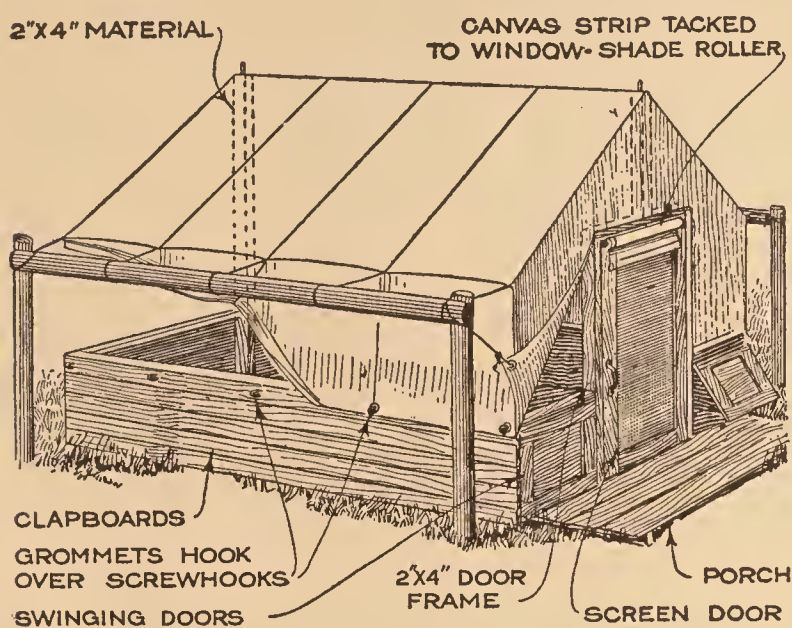
The foil strips may be made up of any number of short pieces, which should not be glued, but sewed together with a needle and thread, the stitches being taken through the cloth. A brass connecting clip is sewed at one end so that one of the



cross strips is underneath and in contact with it. The thread should be drawn as tightly as possible with each stitch, to insure a good contact. The entire aerial is then given a light coat of shellac, and after this has dried, another coat is applied along the edges of the tinfoil strips. —H. H. Schneckloth, Omaha, Neb.

Tent for Permanent Camp

The interior of an ordinary wall tent may be made more comfortable by setting



The Interior of an Ordinary Wall Tent May be Greatly Enlarged by Setting the Tent on Top of Wooden Walls; a Screen Door Keeps Out Insects

the tent over a wooden wall, 2 or 3 ft. high, and fastening the guy ropes to a raised railing at the sides, as shown in the drawing. The front end of the wall is provided with a door frame to which a screen door is attached. A short tent pole is attached over the center of the door frame to support the front end of the ridge pole; a longer pole will be required at the rear to allow for the height the tent is elevated. Additional ventilation may be obtained by fitting smaller doors in the wall, at each side of the entrance. A window-shade roller to which a strip of canvas is tacked may be fitted at the top of the door to prevent rain from blowing in, and for additional privacy. The tent is attached to the wooden wall by hooking the grommets, or eyelets, on the bottom edge of the canvas over screw-hooks.

Blackboard-Cleaning Compound

The school-teacher who serves as his or her own janitor can clean blackboards more easily and quickly than by washing them if the boards are wiped off with a cloth to which sweeping compound has been applied.

Keeping Trees Straight

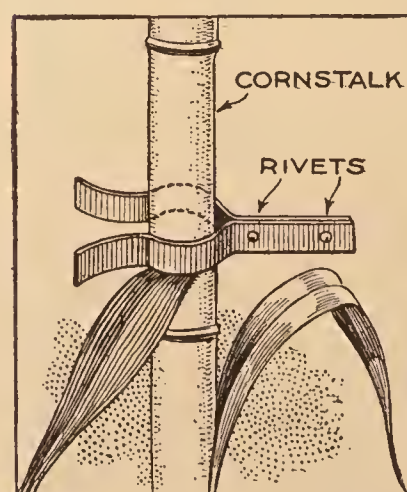
"As the twig is bent," so runs the proverb, "the tree inclines," and any observation of an orchard will show a surprisingly large number of trunks that are not perfectly upright; the trees were planted upright, but nevertheless some slope one way and some another.

After the planting process, young trees are often made to lean by unequal settling. If they are puddled in, tree by tree, or if irrigation is used in settling, the trees should be inspected when the earth has subsided, and if the trunks are not upright, the trees should be straightened, pressing more earth about them to maintain the new position. More than one orchard is made to look ill-kept by trunks sloping in all directions, because the planter did not observe this precaution. In regions where the prevailing winds blow from a certain quarter, more sloping trunks will show in an unprotected location, than where the trees are partly or entirely protected from the clear sweep of the wind. Trees planted in very shallow holes are particularly sensitive to natural influences and soon lose their erectness.

The most attractive orchards are always distinguished by clean, straight trunks, and the thing to remember is that the time to insure such results is during the early life of the tree. Most trees get "bent" in the period directly following their setting out. —Oscar C. Place, Boulder, Colo.

An Efficient Corn Stripper

For stripping the ears and foliage from cornstalks, as well as for removing the leaves from sugar cane, sorghum, and



other stalks from which sirup is to be made, the stripper shown in the drawing will be a great convenience. The device is made from two pieces of flexible steel which are bent to the shape shown, riveted together, and provided with a handle for convenience in using.

In use, the stripper is snapped over the stalk or ears, and then drawn downward, thus severing the leaves from the stalk. —G. A. Tibbans, Galena, Kan.

Kerosene-Emulsion Spray

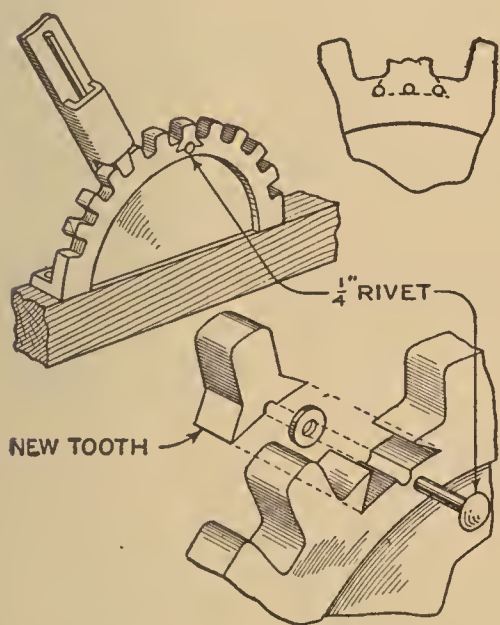
A kerosene emulsion for combating the ravages of scale insects, woolly aphis, and various sucking parasites, is made by mixing 10 lb. of hard-soap chips with 20 gal. of kerosene and 20 gal. of water.

The soap chips are dissolved in the water under moderate heat, and the kerosene is added gradually as the soap dissolves, mixing thoroughly. When the soap has entirely dissolved, the mixture should be churned for about 15 minutes.

For use against plant lice, and other sucking insects, during the growing season, the emulsion is diluted with about 20 gal. of water and applied with a spray; against scale insects and woolly aphis it is diluted with about 10 gal. of water.

Repairing Broken Lever Sector

While using a corn cultivator for listed corn, one of the teeth on the shovel-regulating lever sector was broken off.



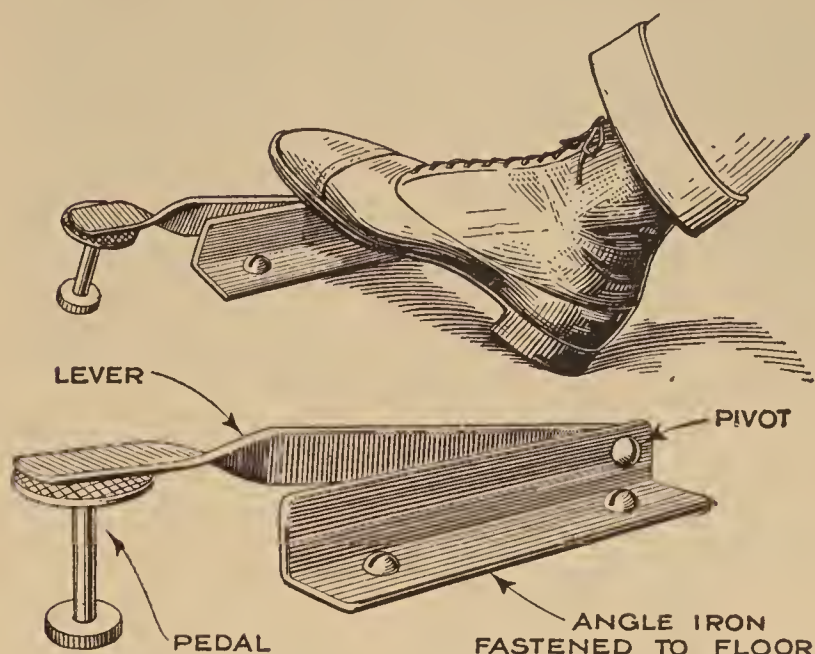
The broken tooth, as usually happens, was the one most used, and the tooth ahead or back of the broken one did not permit the shovels to be regulated properly. The root of the broken tooth was filed off flush with the

sector, and a dovetailed groove was made to accommodate a new tooth, formed from flat stock with a hacksaw and file. A $\frac{1}{4}$ -in. hole was drilled through the tooth and its dovetail groove, countersinking the hole on one side, so that the rivet used for holding the parts together would clear the lever. After the rivet had been upset, the new tooth was as firm and rigid as the original.—George G. McVicker, North Bend, Neb.

Improving the Accelerator Pedal

Anyone who has driven an automobile is familiar with the strained position in which the foot must be held to operate the accelerator pedal. A pedal requiring a downward pressure of the foot permits road shocks to jolt the foot and gives a jerky action to the engine. The usual ac-

celerator will be greatly improved by the addition of the simple device shown in



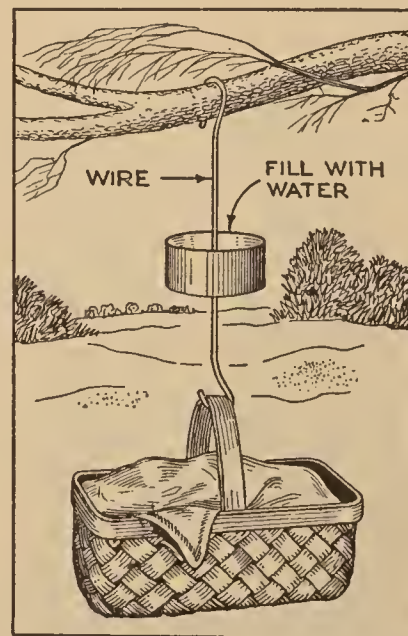
Attachment for the Accelerator Pedal of an Automobile That Assures Foot Comfort to the Driver and Complete Control of the Engine at All Times

the drawing. It consists of a 4-in. piece of angle iron, fastened to the floor of the car with two bolts. Pivoted to the upright section of the angle is a length of flat iron twisted at the end to fit over the accelerator pedal.

In use, the foot rests on the edge of the angle iron and as it is moved to the left the accelerator is depressed. The foot is in a comfortable position and the engine is under complete control at all times.—Thomas W. Benson, Philadelphia, Pa.

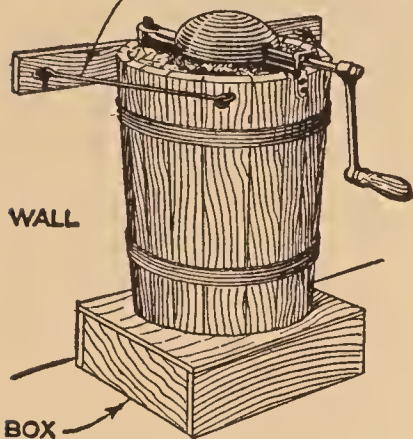
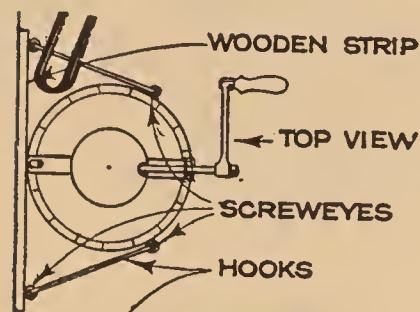
Keeping Ants from Food

One of the inevitable difficulties of picnic parties is the separation of ants from the food, which is usually necessary if the members have any scruples against ants as garnishing. The insects may be prevented from gaining access to the lunch by suspending the baskets from the limb of a tree, using the hook shown in the drawing for the purpose. Such a hook is easily made from a piece of stiff wire and a can lid. A hole is made in the center of the lid, the wire is passed through and soldered, and hooks are bent at each end. In use, the can lid is filled with water, which forms an effective barrier against any creeping or crawling insect.



Ice-Cream Freezer Held Stationary

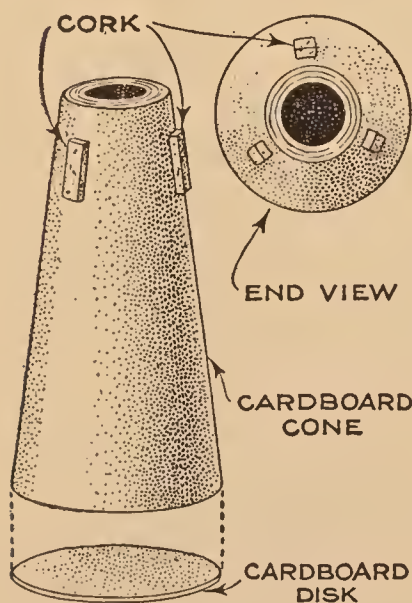
Those who have struggled with an ice-cream freezer will appreciate the value of this simple idea, which provides a sure means of holding the freezer in place as



the cream is frozen. Two hooks, about 7 or 8 in. long, are fastened to opposite sides of the wooden tub about 2 in. from the top, as shown. After the freezer has been placed on a strong box, or chair, at the proper height for turning the crank, a 2-in. wooden strip is fastened to the wall at the same height as the hooks on the freezer. In this strip are placed two screweyes for holding the hooks. With the screweyes properly spaced, the freezer will be held against the wooden strip and all slipping and turning, during the process of freezing, will be prevented.

Making a Mute for a Cornet

To diminish the tone of a cornet for practice purposes, or for producing the popular saxophone effect, a mute is necessary. Such an article can be made from the conical cardboard cores that wrapping string is wound on. These cores may be easily obtained from almost any store. For a cornet mute this should be about 6½ in. long, although any size may be used with varying results. Three small strips of cork are glued equidistantly around the small end of the cone, to hold the mute



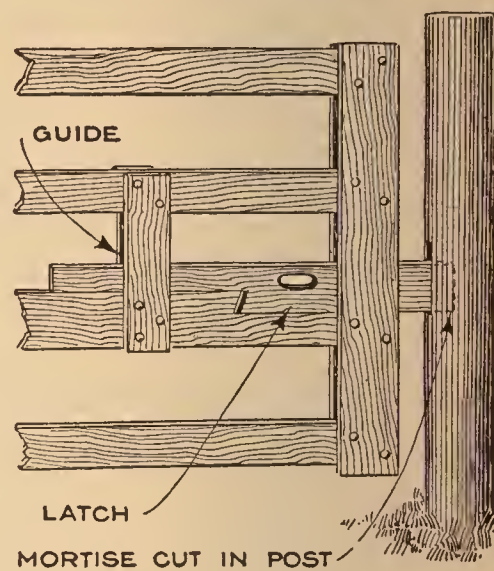
inside the bell of the instrument. A cardboard disk glued over the open end completes the mute, which is ready for use after it has been given two coats of shellac.—Philip A. Wall, Bedford, Mass.

Couplers for Toy Trains

For toy railroads, small tractors with trailers, and similar toys, a coupler is generally needed which must be so simple that "a child can operate it." One way of making them is this: The parts of snap fasteners are separated and soldered to short lengths of flexible wire, the wires being attached to the toys. To connect two cars or toys, it is only necessary to snap the two parts of the fasteners together. The snap fasteners are readily obtainable at any notion counter.—Geo. E. Perkins, S. Bound Brook, N. J.

An Animal-Proof Gate Latch

One of the farmer's worries is the possibility of his stock opening the gates of their pasture, and gaining access to his own or his neighbor's crops. Horses and cattle speedily learn to open gates fitted with an ordinary latch, and when they do this, it is usually a case of hunting up the stock — and paying for the damage.



A simple latch, that is proof against such animal intelligence, consists of a notched wooden bar, fitting against a similar notch in one of the rails of the gate. This bar is provided with a hand-hole, and the end slides into a mortise cut into the gatepost. The latch is held in position by guides fastened to each side of the gate.—G. A. Tibbans, Galena, Kan.

Healthful Poultry Roosts

Opinions differ on this, as on other points, but investigators discover a growing number of commercial poultry men who have eliminated dropping boards, under one plan or another. Some do it to save labor, others because they believe it to be more healthful. The arrangement herewith described is effective, gauged by either consideration.

The perches, or roosts, are placed at the usual height from the floor. On the floor, in front of the outermost roost and parallel with it, a 12-in. board is set on

edge, a similar board being nailed to the back wall. At 3-ft. intervals, 2-in. cross strips are nailed to the front and rear boards. The whole is then covered with 2-in. poultry netting.

Under the dropping-board system, the roosting fowls are exposed to the ammoniacal fumes rising from the droppings. The boards also provide breeding and lodging places for various parasitic pests; these disadvantages are overcome when the droppings accumulate on the floor underneath. The accumulated droppings are removed only as required or convenient.

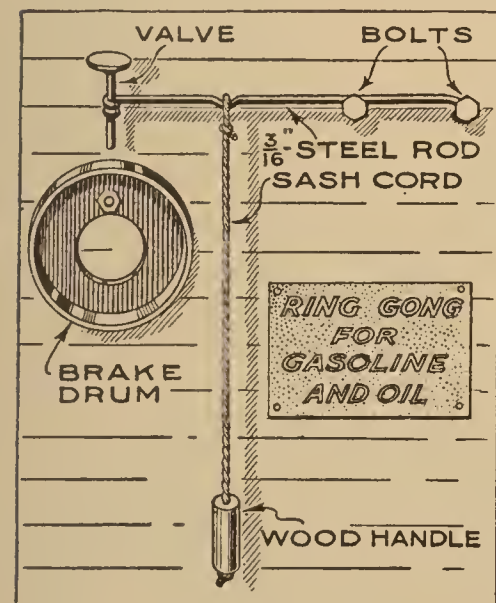
The special object of the poultry netting deserves mention. Unless the droppings are covered in some manner, the fowls will scratch more or less under the roosts; if any of the flock happen to have worms, this condition is communicated to the rest of the flock, as the droppings will contain eggs, which the fowls will find and eat. The wire covering prevents this.

The main objection to allowing droppings to accumulate is, that moisture is collected and held; this can be overcome somewhat, by covering with dry dirt or ashes from time to time.

Gong Made from a Brake Drum

A call bell, or gong, suitable for use in the shop or garage, can be made from a discarded automobile brake drum. A single bolt is used to attach the drum to the wall. For the striker, a piece of light

steel rod, about $\frac{3}{16}$ in. in diameter, with an old valve, or similar piece of metal, fixed to the end, in line with the drum, is used. A piece of rope and a handle are provided for bringing the striker into contact with the drum.

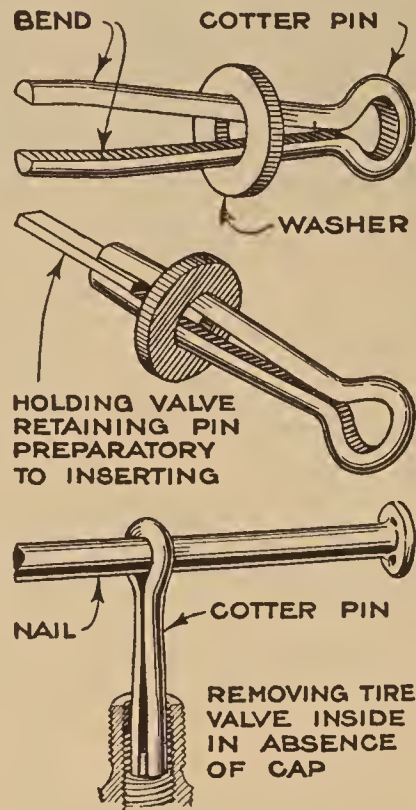


The spring of the steel rod, of course, pulls the striker back again.

Men using welding apparatus should wear suitable goggles for eye protection, having frames that are nonconductors of heat (not celluloid), side shields, and lenses of proper color.

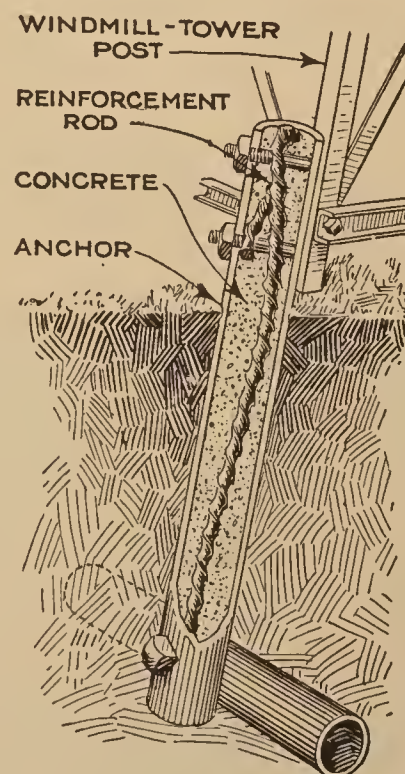
Wrenches and Pliers from Cotter Pins

When inserting the valve-retaining pin that holds the spring seat to the valve stem, it is rather difficult to prevent the pin from dropping. For holding these pins and for inserting pins, screws, and other parts in close places, an ordinary cotter pin can often be used to advantage. The points of the cotter are bent as shown, and a small washer, to hold the ends together, is slipped over it. In the absence of a valve cap, a cotter pin and nail can be used as shown for removing the inside from a tire valve.—G. A. Luers, Washington, D. C.



Reinforcing Windmill Anchor Posts

When a windmill was built, about 15 years ago, $3\frac{1}{2}$ -in. pipe was used for the anchor posts, in the belief that it would last as long as the wooden tower. However, the anchors gradually rusted until they were no longer safe. In order to replace them with a minimum of trouble, $\frac{3}{4}$ -in. reinforcing rods were placed in each post at one side of the anchor bolts. The pipes were then filled with a free-running mixture of sand and cement, which was thoroughly tamped. Now, even though the metal may rust entirely away, the anchor posts will be as strong as new ones. The concrete filling should be mixed in the proportion of two parts sand to one part cement, and should be of a quaky consistency.—Geo. F. McVicker, North Bend, Nebr.



Number of Feet in Pound
of Insulated Wire

Amateur electricians will welcome the handy table shown below.

B & S GAUGE	SINGLE COTTON- COVERED	DOUBLE COTTON- COVERED	SINGLE SILK- COVERED	DOUBLE SILK- COVERED
20	311	298	319	312
21	389	370	403	389
22	488	461	503	493
23	612	584	636	631
24	762	745	800	779
25	957	903	1005	960
26	1192	1118	1265	1202
27	1488	1422	1590	1543
28	1852	1759	1972	1917
29	2375	2207	2570	2485
30	2860	2534	3145	2909
31	3800	2768	3943	3683
32	4375	3737	4950	4654
33	5390	4697	6180	5689
34	6500	6168	7740	7111
35	8050	6737	9600	8834
36	9820	7877	12000	10039
37	11860	9309	15000	10666
38	14300	10636	18660	14222
39	17130	11907	23150	16516
40	21590	14222	28700	21333

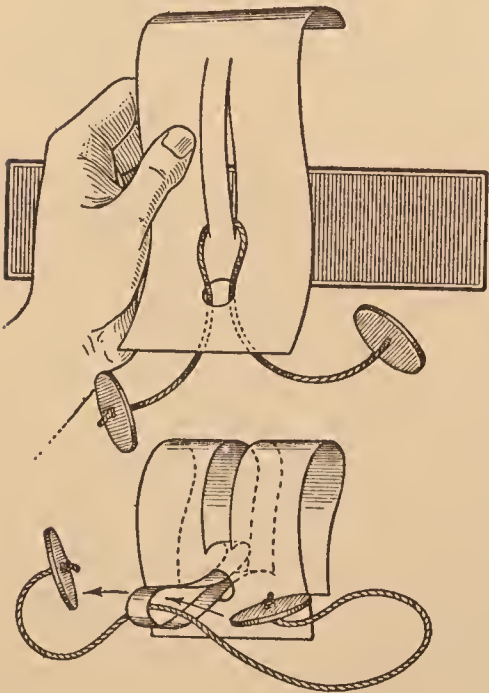
This Table Gives the Number of Feet per Pound of Insulated Magnet Wire Used in the Construction of Radio and Other Electrical Apparatus

Doorstops Elevate Child's Chair

When a child must sit at a table with his face level with his plate and his arms below the table he learns table manners slowly. By screwing wooden doorstops, such as are used to prevent doorknobs from digging holes in the plaster, into the bottoms of the legs, the chair is elevated sufficiently, in most cases, to bring the child to a position where he can dine comfortably.

A Simple Paper Puzzle

An entertaining and clever puzzle can be made from a piece of paper and some string. It will give the puzzle fan some-



thing to worry about in getting the large cardboard disks seemingly to pass through a very much smaller hole.

A piece of strong paper, about 3 by 6 in., has two slits cut in the center about 3 in. long and 1/2 in. apart, so that the paper

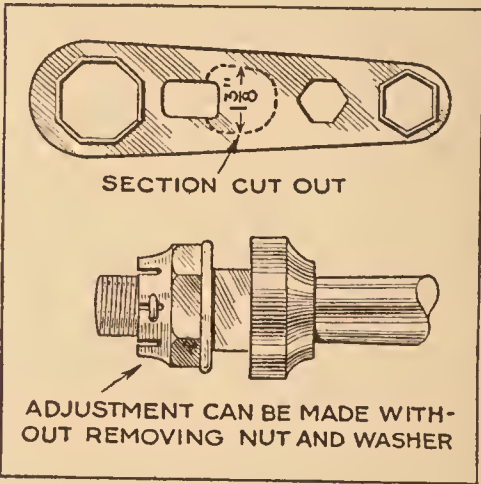
between the cuts can be pulled up like a loop. About 1/2 in. below the slits, a hole

a little over 1/2 in. in diameter is made; this hole should be wide enough to permit the paper loop to pass through it as shown in the lower drawing. A cardboard disk, about 1 in. in diameter, is tied to each end of a short piece of string.

The puzzle apparently consists of passing the twine through the loop in the paper and the pasteboard disks through the round hole, which, it should be remembered, is only half their diameter. The trick is easily accomplished by pulling the loop of paper formed by the slits through the smaller hole as far as it will come, passing one of the disks through it, as indicated in the lower drawing, and then allowing the loop to go back to its original position.—S. Leonard Bastin, Bournemouth, Eng.

Wheel-Bearing Wrench for Light Car

The wrench used for tightening and adjusting the front-wheel spindle cones of



a popular light car, may be improved by cutting out a section at one side of the spindle slot.

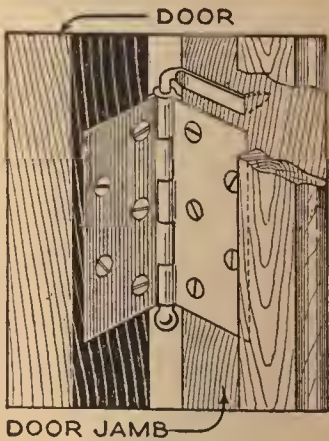
This opening should be cut to the shape and dimensions illustrated, and will permit ad-

justment of the cones without first removing the outside spindle nut and washer, which must be done if the wrench is not altered.

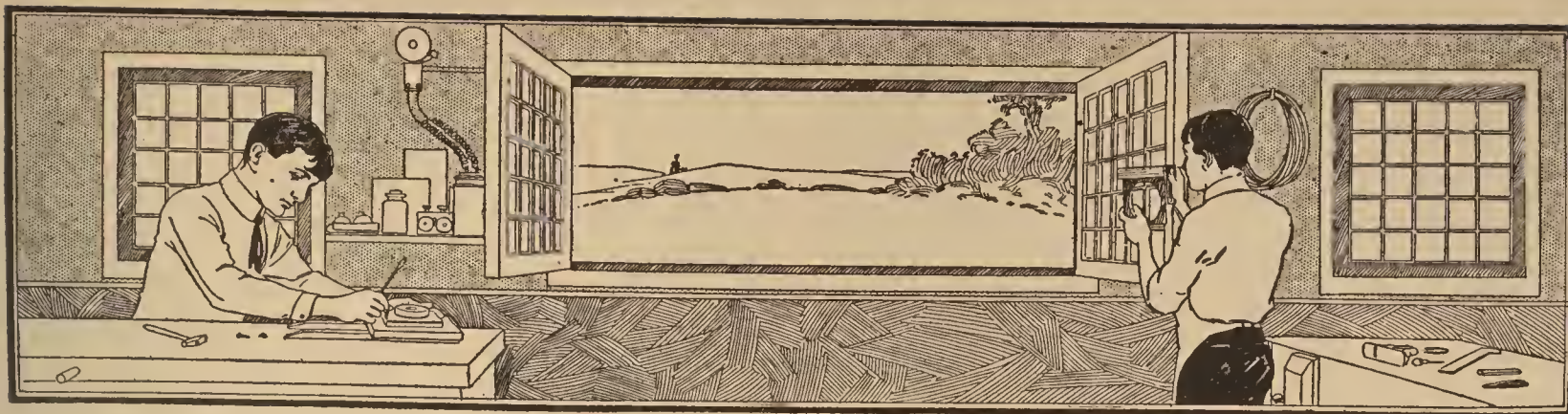
Making Loose-Pin Hinges Tamper-Proof

A locked door, fitted with loose-pin hinges, can sometimes be opened by taking out the hinge pins. A simple kink that will prevent this is to make

a pin as shown in the drawing. One end of the pin is flattened, bent at right angles, and countersunk in the jamb. A point is turned on this flattened portion and driven into the jamb, thus making it impossible



to remove the pin when the door is closed.—L. E. Brundage, Norwood, Colo.



A Desk Cabinet for Radio Apparatus

BY F. L. BRITTIN

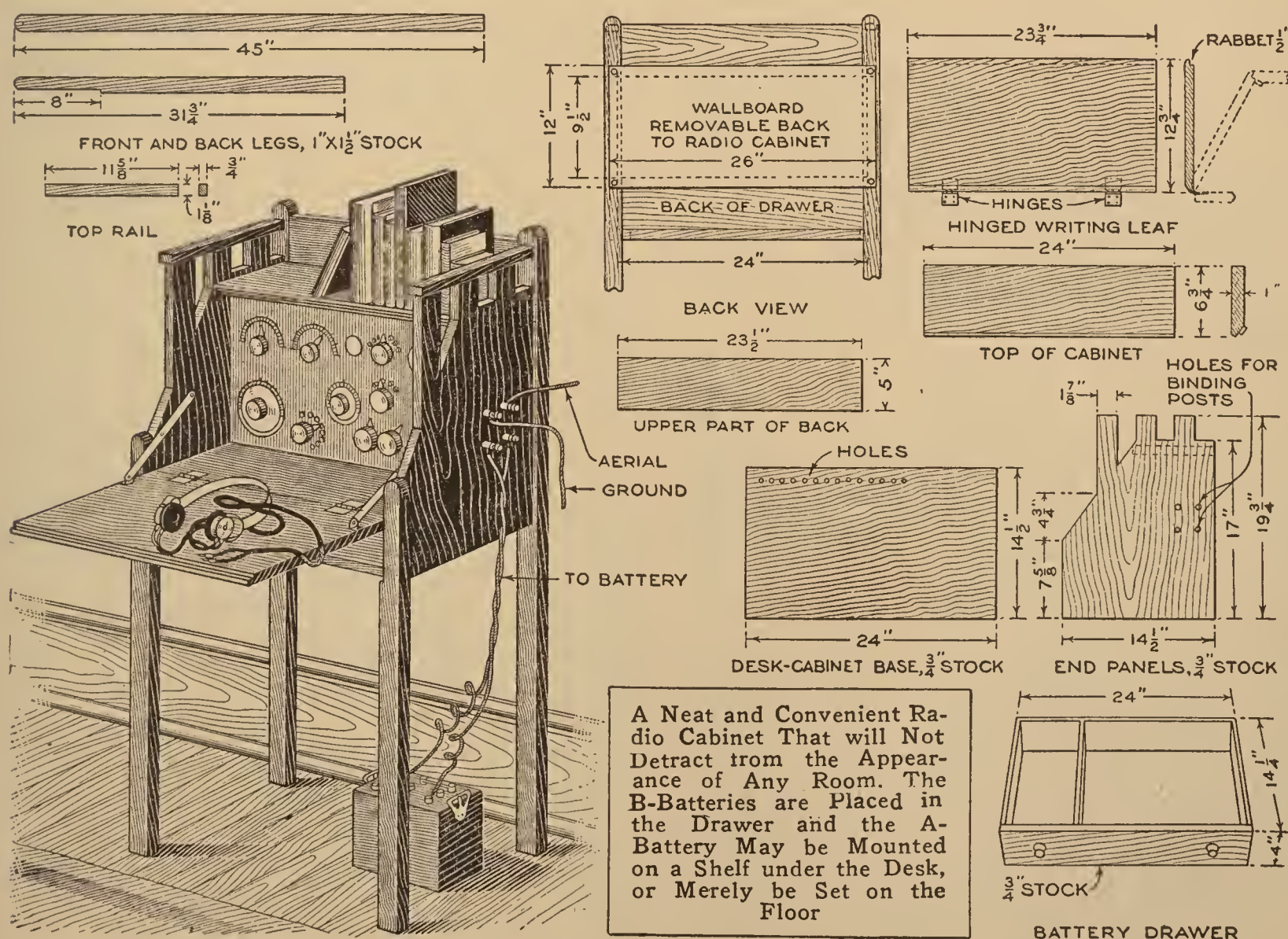
NO longer does the radio enthusiast, from the beginner to the most advanced operator, consider it necessary to make of his laboratory a bewildering maze of wires, casually arranged switches, and ponderous and conspicuously disposed apparatus. The modern tendency is to inclose the entire set and make it as compact as possible, so that little or nothing is visible but the necessary adjusting knobs and binding posts.

The drawing shows a radio-instrument cabinet that is very neat and convenient, as all the instruments are completely protected from injury and dust; there is a commodious drawer and writing leaf, and all binding posts, with the exception of those for the phones, are on the outside, so that the apparatus need not be discon-

nected when the cabinet is closed. The construction cost is slight, and the materials are readily obtainable and easily worked, to the dimensions given, in the amateur's workshop. The dimensions are taken from a cabinet that has actually been constructed, although it may be necessary to alter them more or less, to suit the builder's radio set.

The kind of wood is, of course, entirely optional; almost any hardwood can be used, and finished as desired, although for this particular style, which is designed somewhat along mission lines, the use of oak, stained green or fumed, is suggested. However, if the other furniture in the room is mahogany, birch may be used, finished to correspond.

Care should be taken to fit all parts



accurately; the end panels should be grooved to take the horizontal pieces, and the joints should be coated with good glue, to supplement screws, wherever necessary.

The following materials will be necessary:

- 2 legs, 1 by $1\frac{1}{2}$ by $31\frac{3}{4}$ in.
- 2 legs, 1 by $1\frac{1}{2}$ by 45 in.
- 2 top rails, $\frac{3}{4}$ by $1\frac{1}{8}$ by $11\frac{5}{8}$ in.
- 2 end panels, $\frac{3}{4}$ by $14\frac{1}{2}$ by $19\frac{3}{4}$ in.
- 1 writing leaf, 1 by $12\frac{3}{4}$ by $23\frac{3}{4}$ in.
- 1 cabinet top, 1 by $6\frac{3}{4}$ by 24 in.
- 1 cabinet base, $\frac{3}{4}$ by $14\frac{1}{2}$ by 24 in.
- 1 upper part of back, $\frac{3}{4}$ by 5 by $23\frac{1}{2}$ in.
- 1 piece wallboard, 12 by 26 in.
- 2 pieces for back and front of drawer, $\frac{3}{4}$ by 4 by 24 in.
- 2 drawer ends, $\frac{1}{2}$ by 4 by 13 in.
- 1 drawer bottom, $\frac{1}{2}$ by $14\frac{1}{4}$ by 24 in.
- 1 hard-rubber panel, $\frac{1}{4}$ by $9\frac{1}{2}$ by 24 in.
- 2 brass hinges.
- 2 leaf brackets.

The instrument panel is made of hard rubber, with the various instruments grouped to meet the individual taste of the builder. This particular set is mounted for the short-wave regenerative

hook-up, with audion bulb and controls. If desired, the upper shelf may be divided into pigeonholes, but using it as a bookshelf adds considerably to the cabinet's appearance. The back panel is made of wallboard, and is removable for easy access to the instruments and circuits, to make changes and adjustments. The drawer should slide easily without binding, and may be partitioned off as desired, although, as shown, it is used for holding a bank of B-batteries, with flexible leads of sufficient length to permit the drawer to be pulled out.

The hinged writing leaf is covered on the writing surface with green felt, extending back to the panel; this is applied in two pieces and is glued to the wood, providing a measure of protection if the phones should be dropped on the hard surface. The hinges are countersunk, and they, as well as the brass brackets which hold the writing leaf, are obtainable from any hardware store.

A Tree Pergola

The idea of growing an ornamental flowering vine over the dead trunk of a tree suggested a pergola top. After the tree had been sawed off to the height desired, the bark and sapwood were peeled off with a drawknife, and a smooth, even



The Trunk of a Dead Tree is Converted into an Attractive Pergola, over Which an Ornamental Vine is Trained

surface thus secured. A straight board and a level made it easy to bring the two branches of the crotch to the same height; trial determining the height that would appear best—in this case about 11 ft. The top is made of two 2 by 4-in. pieces resting in recesses on the sides of the trunk and having their tops flush. These pieces are each 12 ft. long and the ends were curved, as shown. The 4-in. sides were nailed to the trunk, while the $2\frac{1}{2}$ -ft. crosspieces, of the same stock, were nailed, broad side down; these were spaced about 8 in. apart and had their ends beveled on the underside. Two coats of oil, into which burnt umber had been stirred, gave the pergola a neutral brown color and, of course, helped to preserve the wood.—C. L. Meller, Fargo, N. D.

Old Negatives Make Table Mats

An attractive mat for preventing hot dishes from injuring the finish of the dining table can be made from discarded photographic negatives and magazine illustrations.

The emulsion is first cleaned off the glass by soaking the negatives in hot water, two negatives being required for each mat. The picture is mounted on an appropriate background of light-weight cardboard, or, if desired, a picture can be used on each side. The cardboard, with the picture attached, is placed in position between the two pieces of glass, and the edges are bound with passe-partout tape.

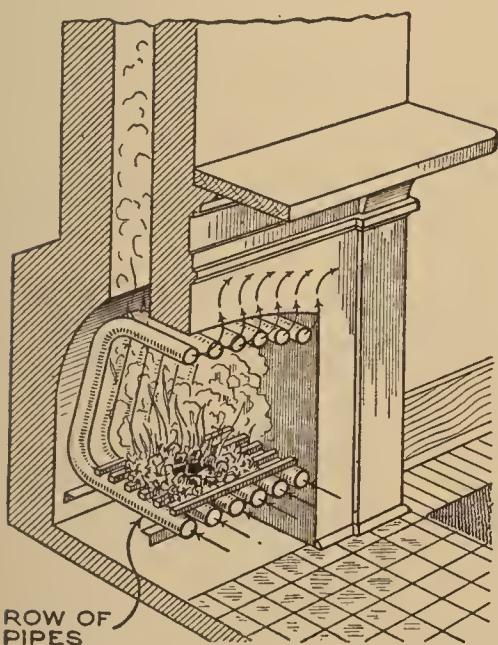
Hints on Using Postcard Projectors

The greatest disadvantage of postcard projectors is the fact that the original is shown on the screen in a reversed position as regards right and left; this is particularly apparent if there is any printed matter on the card, as it is shown backward. This can hardly be remedied with printed postcards, but when using one's own photographic prints it can be overcome in the printing. Instead of making the print in the usual manner, by placing the sensitized face of the paper against the dull side of the film negative, reverse the film and make the print with the back, or "shiny," side of the film next to the paper. In this manner the original print is reversed, and, as the picture is again reversed in the projected image, the objects in the view will appear in their natural position.

Printed inscriptions, or explanatory matter in connection with the pictures, can be reversed by placing the card and a piece of carbon paper into a typewriter so the carbon side is against the back of the card, and writing the copy in the usual manner; this will show the characters reversed on the back of the card, but when projected, the words will appear in their proper sequence on the screen.—Philip A. Wall, Bedford, Mass.

More Heat from the Grate

Complaint is often made that open fireplaces throw off insufficient heat. The drawing shows a novel idea for utilizing



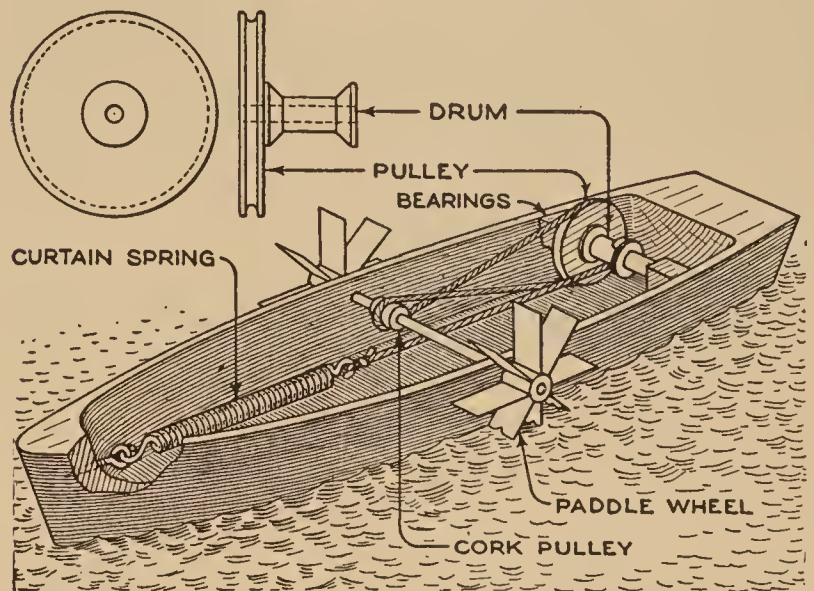
part of the heat that goes to waste up the chimney. A row of U-shaped pipes of fairly large diameter is arranged so that the cool air which enters the bottom of the pipes is heated and passes out of the opposite end into the room.

Many modifications of the arrangement shown are possible, the only rule to bear in mind being that the pipes should be spaced far enough apart at the top to avoid the possibility of interference with the draft.

Spring-Propelled Toy Boat

A length of shade-roller spring forms the motive power for a model side-wheel boat, the hull of which is built along the usual lines for such craft.

The paddle wheels are mounted on a stiff wire shaft, on which a cork pulley, about $\frac{1}{2}$ in. in diameter, is forced, the wheel assembly being mounted amidships. The pulley-and-shaft assembly,



A Spring-Propelled Toy Boat That can be Easily Made for the Entertainment of the Children. There Are Few Parts to Break or Get Out of Order

mounted at the stern, consists of a grooved pulley tacked to the end of a spool, the whole revolving smoothly on a shaft made from a wire nail.

The spring is cut to such a length that, when one end is secured at the stem, the other will reach halfway to the pulley axle at the stern. One end of a stout string is tied to the free end of the spring, the other end being fastened to the spool with a small brad. Power is transmitted to the paddle wheels by means of a string belt.

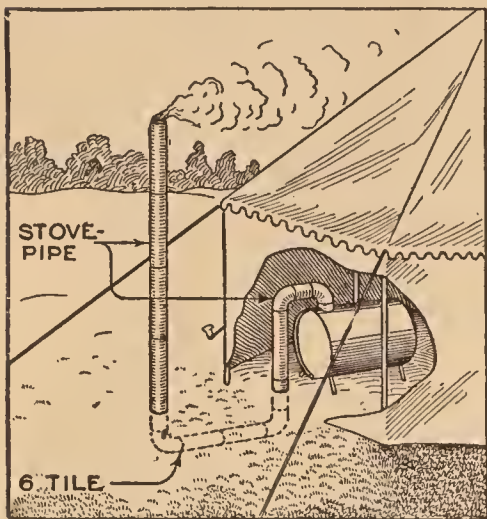
The craft is "wound up" by turning the paddles backward, until the spring has been stretched to double its length. By using two or more pulleys, to increase the ratio of revolutions of the paddles to the drive pulley, such a boat can be made to develop considerable speed and make quite extended voyages.—Edwin M. Love, Alhambra, Calif.

Automobile Chain Lock

Automobile tire chains are often lost on the road because the chain locks with which they are fitted open. Such losses can be easily prevented by wrapping one or two layers of tire tape around the locks. A tightly twisted wire loop might also do, but this is likely to slip off, permitting the lock to open.—Oscar W. Hallin, Braham, Minn.

Running Stovepipe outside Tent without Cutting Canvas

When a stove is used in a tent, it is usually necessary to cut a hole somewhere



in the wall for the stovepipe, but by the method shown, cutting the tent is unnecessary. The stove shown is made from a steel oil barrel, having a door cut into one of the heads and

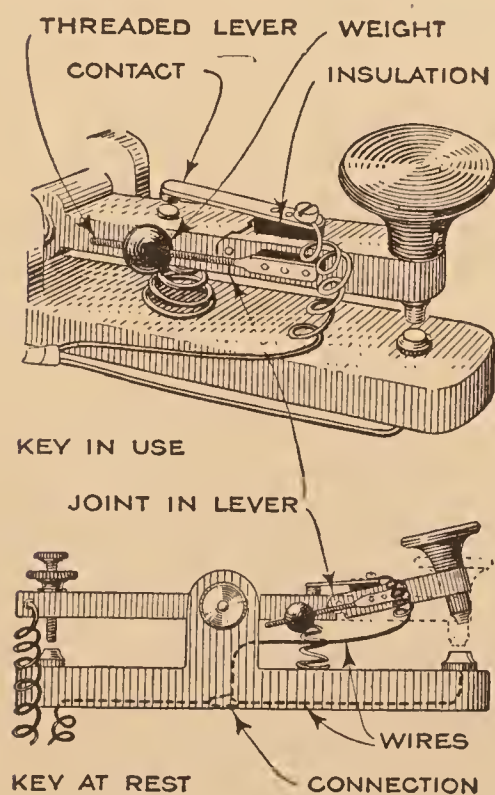
mounted on supports. A hole is cut on the top of the barrel, near the rear head, for the pipe. The underground stovepipe connections are made of 6-in. tile. This arrangement has been in use for three successive winters and has proved eminently satisfactory.—R. A. Griffith, Monticello, Ill.

A Self-Closing Telegraph Key

Every telegraph key in an American circuit must be kept closed when not in actual use. The switch commonly provided in series with the key must be opened or closed by hand, and it is de-

cidedly human to forget to do this.

The drawing shows a telegraph key that automatically closes the circuit as soon as the operator's hand is removed from the knob. The key lever is jointed, or hinged, about the center of the front half. Firmly attached to the part in front



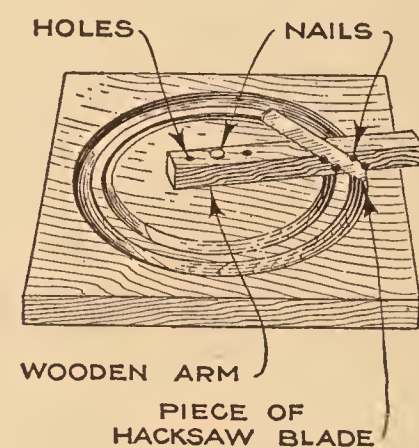
of the joint, is a light wire lever, which is threaded so that a weight may be screwed up or down upon it, to adjust the pressure on the contacts. A light spring may be used instead of the weight and lever, if desired. Attached to, but insulated from,

this forward portion of the key lever, is a short metal finger, the free end of which is fitted with a contact point; this finger is connected to the circuit by a wire, which is also connected to the lower main contact of the key.

When at rest, there is no hand pressure upon the key knob, and the weight causes the front portion of the key lever to rise a short distance, until the metal finger makes contact with the main part of the key lever. Thus, there is an unbroken pathway for the current from one side of the line to the other, through the contact points on the metal piece and key lever; yet, at the slightest touch of the finger, the key comes to the normal sending position, automatically opening the line.—Samuel W. Beach, Washington, D. C.

Forming Circular Moldings

Broken hacksaw blades can be used for making circular moldings, or picture frames, of almost any pattern. A suitable block of wood is provided with a revolving



arm at its center, the latter consisting of a strip of wood, about $\frac{3}{4}$ in. square, and 8 or 12 in. long. A nail is driven through one end to form a pivot, and a piece of the broken saw blade is attached to the

opposite end, at the desired radius and angle. The pivoted arm is worked around the board, the bits of saw blade used for the cutters forming the molding.—Geo. H. Holden, Chesterfield, Eng.

Growing Watercress Indoors

A constant supply of watercress can be obtained during the winter months by growing it indoors. A bottomless wooden box is needed, with a piece of flannel stretched across the top and tacked in place; this is the "garden." Sprinkle water on the flannel until it is thoroughly wet, and sow the cress seed rather thickly over the surface. The flannel must be kept constantly moist. It requires about two weeks to raise a crop, though germination may be hastened by covering the seeds with a piece of paper for the first two or three days, then removing the paper and permitting plenty of light to reach them.—James E. Noble, Portsmouth, Ont.

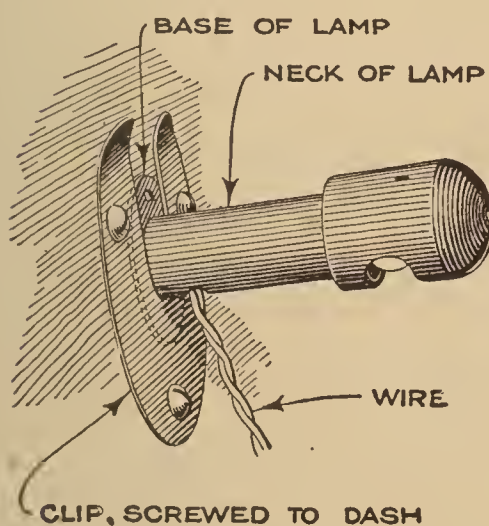
The Magic Handkerchief

Obtain some cobalt chloride, and dissolve thoroughly as much of it as will cover a ten-cent piece in three teaspoonfuls of water. Soak a handkerchief in the solution. Then remove and place it in a warm place to dry. After drying, owing to the absence of moisture and the presence of heat, the handkerchief will be blue. The least bit of moisture will cause the color to disappear.

Show the handkerchief to some friends while it is blue. Roll it in a ball between the hands and blow on it several times, until the color disappears. The trick can be performed indefinitely with a single treatment of the fabric. If too much of the chemical is used, it will not work so readily.—Mallory Dufur, Baltimore, Md.

Holder for Dash Lamp

An ordinary dash lamp can be so mounted on the car that it may be removed easily, and used as a trouble lamp,



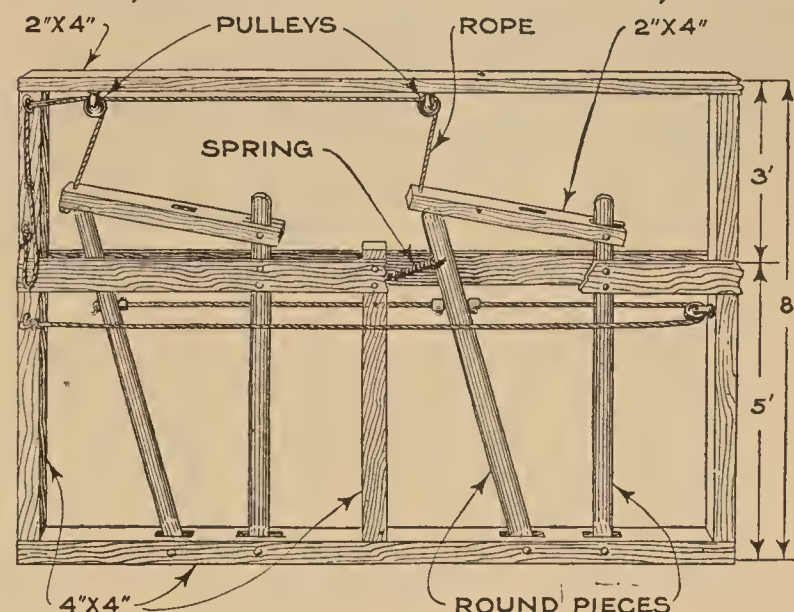
without in any way interfering with its regular use. A circular piece of sheet metal, of the proper diameter, is provided with a slot of sufficient width to accommodate the shank of the lamp, as indicated in

the drawing. Holes are provided in the resulting clip for attachment to the dash. The flange of the dash lamp fits behind the clip, which is formed so as to hold it securely in place, although it can be readily removed whenever desired.—Roy E. Kingsley, Melrose, Mass.

Making a Cattle Stanchion

With no more than ordinary tools and a few pieces of lumber, the farmer can build a satisfactory cattle stanchion. A timber framework is first erected; this is braced by two planks, nailed or bolted to opposite sides of the vertical ends of the frame. The stanchion proper consists of two pieces, a vertical member, permanently bolted to the frame and braces, and another pivoted in a mortise in the bottom timber. The horizontal stanchion lock is pivoted at one end to the rigidly bolted

upright, a mortise being provided, at the proper distance from the opposite end, for the accommodation of the movable upright. The vertical parts of the stanchions, if not made of round stock, should

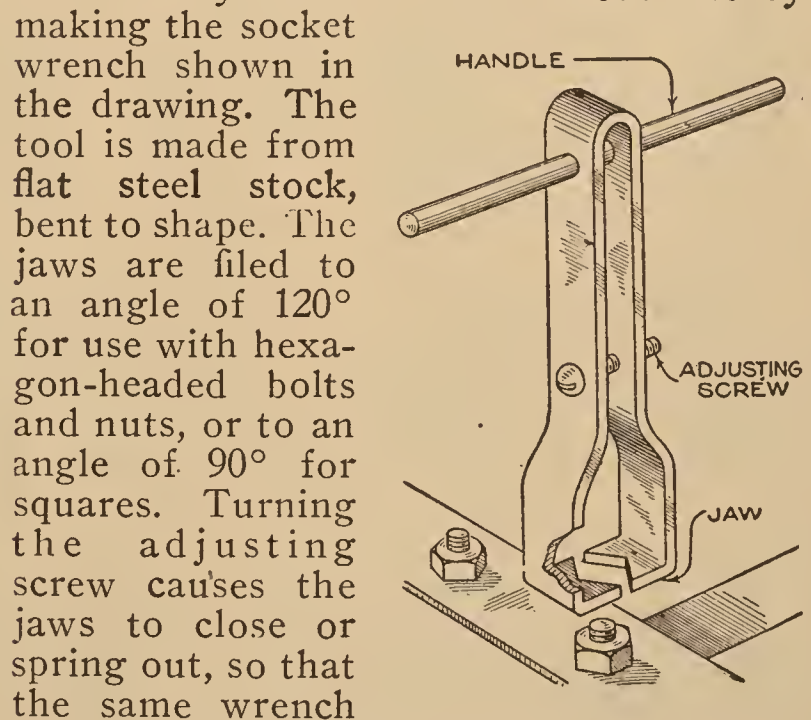


Requiring No More than Ordinary Tools and a Few Lengths of Lumber, a Very Satisfactory Cattle Stanchion can be Built at a Minimum Cost

be rounded off to prevent injury to the cattle. By fitting the stanchions with the system of cords and pulleys illustrated, they can be opened or closed simultaneously.—Stuart Randall, Brooklyn, N. Y.

An Adjustable Socket Wrench

The automobilist or home worker can save money and room in his tool kit by making the socket wrench shown in the drawing. The tool is made from flat steel stock, bent to shape. The jaws are filed to an angle of 120° for use with hexagon-headed bolts and nuts, or to an angle of 90° for squares. Turning the adjusting screw causes the jaws to close or spring out, so that the same wrench



can be made to fit several different sizes of nuts.—R. H. Kasper, Philadelphia, Pa.

Preventing Bicycle Stand from Rattling

The rattling heard on bicycles equipped with stands can generally be traced to the stand itself. The vibration causes the stand to rattle in the latch that holds it in position. This annoyance can be stopped by slipping a piece of rubber tubing over the latch.



MAKING ONE'S OWN STEAMER AND WARDROBE TRUNKS

By Henri Marcelle

Part I—The Steamer Trunk

ONLY such ordinary tools as a hammer, saw, plane, and an old flatiron, are needed to build the steamer trunk described in this article. In addition, a glue pot is needed, and a brush or two, for gluing and painting the finished trunk.

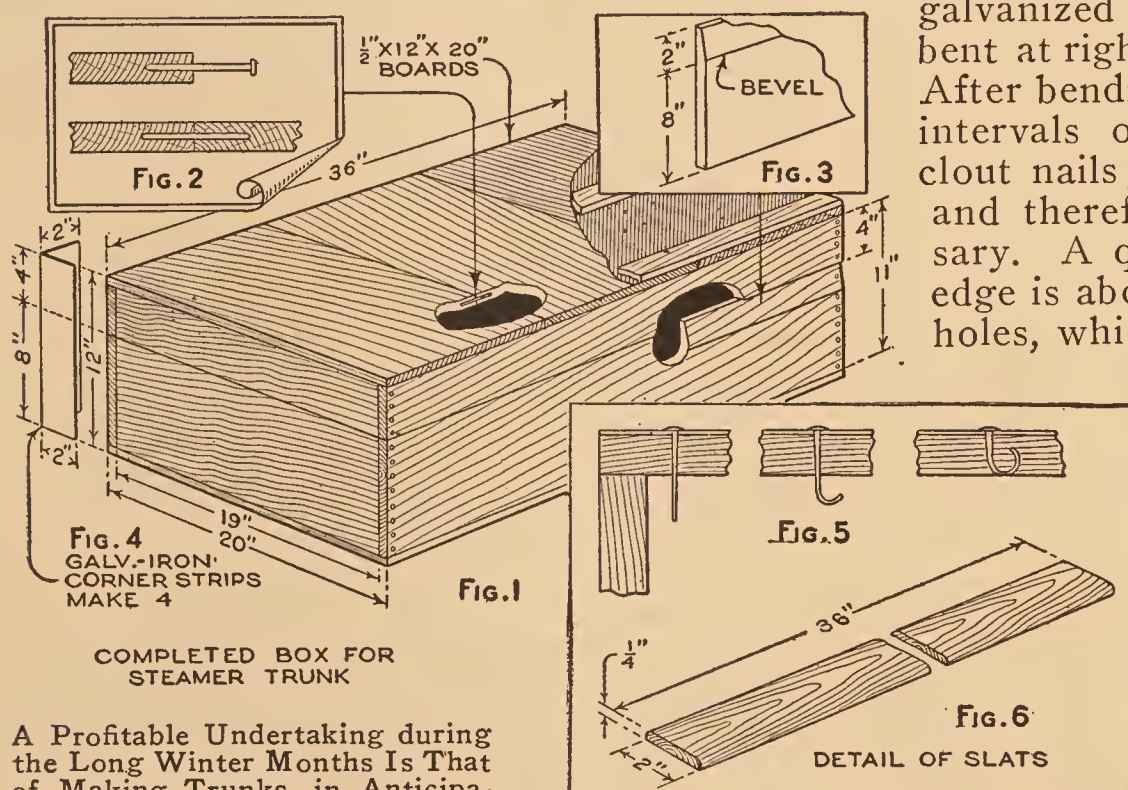
There are several kinds of lumber that can be used in trunk making, and in the order of their desirability they are: three-ply veneer, basswood, spruce, and sugar pine. The veneer costs a trifle more, but is lighter and more durable, and if used

the top; then, starting at a corner, carefully cut through the boards and around the entire box, keeping to the mark, until the box has been sawed into two parts—a lid and a bottom. This method assures the absolute matching of both parts. The lower part is laid on its side and a line is marked on each side 2 in. below the edge. Another line is marked in the middle of the edge, and, using the plane, the outside of the boards is beveled off down to the 2-in. mark, as in Fig. 3. Some strips of galvanized iron, as shown in Fig. 4, are bent at right angles between two blocks. After bending, they are punched at 1-in. intervals on the edges to take 1-in. clout nails; these nails are easily bent, and therefore the punching is necessary. A quarter of an inch from the edge is about the distance to place the holes, which should be punched without raising any burrs.

What is known to the theatrical profession as "scenic linen" is used for covering the trunk, and about 2 yd. of this will be needed. This material can usually be obtained from any stage carpenter, or scenic artist, at little or no expense, and even if bought new, the cost is small. A 14-in. strip,

the length of the piece, is cut off. A pot of glue is mixed, and the outside of the box is given a light coat; this may be thin, as it is intended only to fill up the pores of the wood. When this has dried, apply a thicker coat as smoothly as possible. While the glue is still hot, lay on the linen and smooth it out, with a rubbing motion. After the sides have been covered, the top and bottom pieces can be cut and glued on in the same manner; these should be cut $\frac{1}{2}$ in. smaller than the surface they are to cover.

The galvanized-iron corners are now nailed in place, the method of clinching the nails being clearly illustrated in Fig. 5. The nail is driven through the wood, the point curved with a pair of round-



A Profitable Undertaking during the Long Winter Months Is That of Making Trunks, in Anticipation of the Next Summer's Vacation. The Trunks Described in This Article are Easily Made, and Need But Few Tools

in conjunction with fiber, it is possible to make with it a trunk that is almost indestructible. If any of these woods are used, secure all half-inch material, dressed on both sides, and as clear as possible.

In making the steamer trunk, 12-in. material can be used with no waste. A box is made to the dimensions shown in Fig. 1. To prevent the top and bottom from warping where the boards are joined, $1\frac{1}{2}$ -in. wire nails are driven into the edges of the boards at about 6-in. intervals. Cut off the heads and butt up the next board, as indicated in Fig. 2; if desired, these joints can be glued before they are driven together.

After the top and bottom are in place, mark a line on each side, 4 in. from

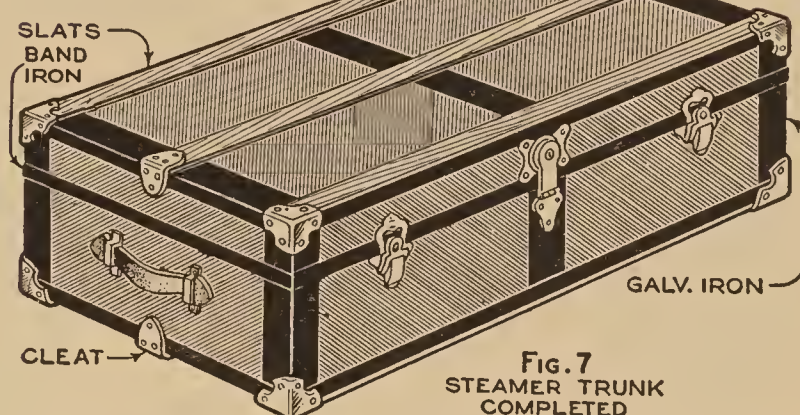
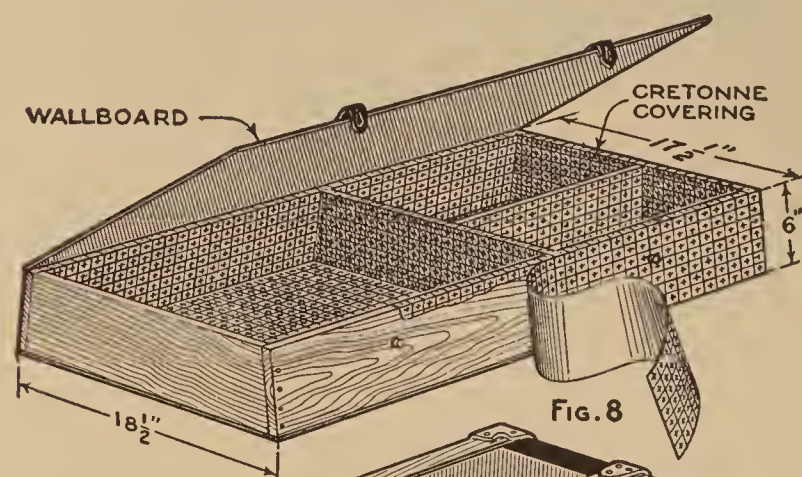
nose pliers; then, holding the old flatiron against the head, the curved point is driven into the wood and clinched by a sharp hammer blow. A strip of galvanized iron, about $\frac{1}{2}$ in. wide, is nailed on each edge of the box, and strips about 2 in. wide across the center of each side and at the ends of the top and bottom, the nails being clinched as described; the black bands in Fig. 7 show the location of these strips.

Eighteen running feet of oak, or hickory, cut and formed to the dimensions shown in Fig. 6, are needed for the slats, which take up a great deal of the wear a trunk is subjected to. Six 3-ft. slats are cut and fastened with clout nails to the top and bottom of the trunk, 6 in. apart. As the wood is too hard to prevent the entrance of the nails without bending them or splitting the wood, it is necessary to drill a hole wherever a nail is to be inserted. A light strip of band iron is run around the whole trunk at the point where top and bottom join; this iron is applied in the manner described for the sheet-iron corners, the nails being inserted every 6 in. Next place a pair of 6-in. strap hinges on one side; three hinges are better, and even four may be used. The following hardware, which can be obtained from almost any hardware store, is required: two strong trunk clasps, four slat cleats, eight corner irons, a pair of trunk handles, and a good trunk lock.

The inside of the trunk is lined with a suitable pattern of cretonne, or similar material, which is applied with ordinary flour-and-water paste. Two $\frac{3}{4}$ -in. strips of wood, 1 by 19 in., are screwed to the inside of the trunk, one in each end of the lower part, and 2 in. from the edge, to support the tray.

The tray is made of material as light as can be obtained; $\frac{1}{2}$ in. for the ends, and

$\frac{1}{4}$ in. for the sides. The top and bottom are made of wallboard, about $\frac{1}{4}$ in. thick.



This Steamer Trunk, While Not Costing Nearly So Much as a Purchased Article, will be Found Quite as Strong and Serviceable

The tray is built to the dimensions shown in Fig. 8, and is made narrower at the top so as to give the lid freedom in closing. After the tray is finished, and partitions added as desired, the lid is attached with a piece of muslin, which is glued to the tray, and acts as a hinge. The tray is then covered with material similar to that with which the trunk is lined. Small straps and buttons are fastened to the lid and tray, respectively, to keep the lid from opening.

The painting of the trunk, and the necessary instructions for constructing the wardrobe trunk, will be discussed in the concluding article, to appear in the March number.

Roofing Paper as a Stucco Substitute

In parts of the country where the winter climate is not so rigorous as in the North, gravel-surfaced roofing paper may be used in place of cement stucco for the exterior finish of dwelling houses, particularly if the half-timbered style of architecture is used.

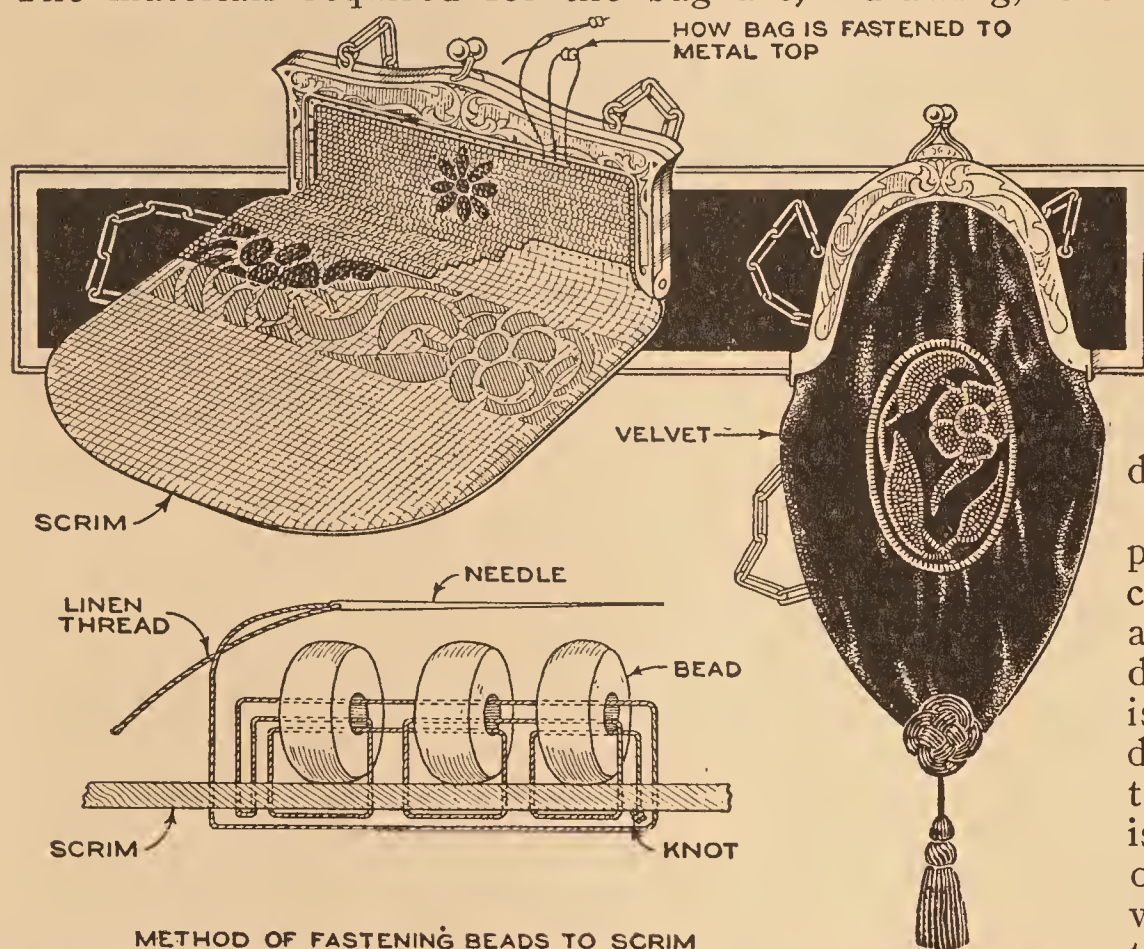
The paper is applied to the walls, gravel side out, before the strips which break the wall up into panels are added. The panels should be arranged so that the joints will come underneath the strips, which will thus effectively hide the unsightly junctions. The paper must be

stretched tightly to prevent wrinkles, which would expose the trick. As the roofing paper is of standard width, it will be necessary to proportion the panels to conform to the width of the paper. Because of the ever-present odor of naphthalene, which is objectionable to all forms of vermin, although not sufficiently perceptible to be annoying to humans, no vermin will lodge under the paper.

Such a covering, applied over the sheathing of the building, is waterproof, and in warm climates, or where the temperature falls little, if any, below the freezing point, is as satisfactory and as attractive in appearance as stucco.

Making Beaded and Velvet Handbags

Beads have been used by woman for thousands of years, and she has not yet wearied of stringing beads on threads and applying them to a background to form various articles of use and ornament, such as the attractive beaded handbags that are at present so popular and—so expensive. However, there is no obstacle to prevent anyone making her own bag at a cost of only the trifling sum required for materials and time. The materials required for the bag are,



METHOD OF FASTENING BEADS TO SCRIM
Beaded Bags are So Easily Made That No Woman need Deny Herself the Pleasure of Owning One. The Decorations may be Worked Out to Suit the Individual Taste

a metal top, which may be obtained from most stores, $\frac{1}{4}$ yd. of scrim, lining material, and the necessary beads. In making the bag care should be taken to have the lines of the scrim run up and down, as these lines serve as guides for sewing on the beads.

Make an accurate design of the pat-

tern to be reproduced, on tissue paper, and trace it onto the scrim with a "4H" pencil, a hard pencil being used to prevent blurring. After the design has been traced, it is filled in with water-color paints as nearly as possible the color of the beads used.

The beads are sewed on one at a time, guided by the lines of the scrim. Linen thread should be used; this is knotted, and the needle is drawn through from underneath, taking a bead of the proper color on the needle. As shown in the drawing, each bead is securely sewed to the fabric. About every third bead the thread is taken back through them in the manner shown; this makes the bag stronger and the row straighter. It is necessary to make each row straight across, working in beads of each color as it occurs in the design traced on the fabric.

Another effective and pleasing bag consists of colored-bead designs applied against a background of dark velvet, or satin. As it is not possible to trace the design on the surface of these materials, the pattern is applied to the underside of the cloth, and is then worked out with colored threads, which gives the worker the necessary guidance, the beads being applied as described. Instead of using beads, the same idea can be pleasingly worked out in cotton yarns of different colors. The design in this case is traced on tissue paper sewed to the material at the exact location, and the yarn is applied through the paper, which is torn off when the work is finished.

Dustless Display Tray

A Canadian stationer exhibits small articles, such as paper clips, pencils, erasers, and the like, in a tray which has a wire-mesh bottom. Thus, instead of the compartments, into which the tray is divided, acting as dust catchers, the dust falls through to the surface of the table underneath. At intervals the tray is removed and the dust sucked up in a vacuum cleaner.—C. J. Henderson, Calgary, Alta.

Strengthening the Ice-Cream Freezer

After an ice-cream freezer has been in use for any length of time, the steel hoops begin to rust away, permitting the staves to loosen. This nuisance may be overcome by driving corrugated steel fasteners across the joints of the staves at both top and bottom. The fasteners will not take the place of hoops, but even if these should drop off, the staves are prevented from falling apart.—Robert Lee Bird, Roanoke, Va.



MAKING ONE'S OWN STEAMER AND WARDROBE TRUNKS

By Henri Marcelle

Part II — The Wardrobe Trunk

FOR the benefit of those who prefer a wardrobe trunk instead of the steamer trunk, this article describes and illustrates its construction and dimensions.

Covering a trunk with fiber increases the cost of construction but little, while adding immeasurably to its life. However, a little extra work is required to apply it. Either with or without fiber, the box is built in a similar manner to that described in Part I,

the cut in this case being made in the exact center of the box, which is 24 in. deep. The other operations, such as bracing the corners, etc., are the same, with the exception that when using fiber, galvanized-iron angle pieces are not used on the edges. In their stead, fiber or rawhide, already pressed into shape, is used; 1½-in. angle fiber or rawhide can be obtained from manufacturers of fiber or rawhide, and in many instances from electrical-supply houses. Holes must be drilled in the fiber or rawhide, whichever is used, to take the nails, as both are very tough.

With such a trunk no wooden slats are necessary, but when the sheet fiber is used, it is riveted down with round-head nails to the wooden base, after lines dividing the surface into 4-in. squares have been drawn on each side of the trunk. The nails are placed along these lines, as shown in Fig. 9. In addition to using the angle fiber on the corners, all the outside edges are similarly protected. The angle fiber is applied after the sheet fiber has been riveted in place, to cover up the exposed edges. Metal corners are used

on this style of trunk as in the steamer trunk, as an additional protection, the standard practice among baggage handlers being to roll a trunk on its corners. The fiber covering, however, should not be applied until the interior accessories of the trunk have been installed, as it is necessary to fasten some of them through the wood.

Of the interior arrangement of the

wardrobe trunk, little need be said, as the taste and needs of individuals will differ. The clothes rack that supports the hangers is made by fastening two tripods, or crowfoots, such as are used in the installation of electric-lighting fixtures, to the inside of the trunk. These fittings can be obtained in various sizes, and should preferably be threaded to take a 3/8-in. pipe or rod. Stove bolts are used to attach them to the trunk before the fiber or canvas covering is applied, the bolt

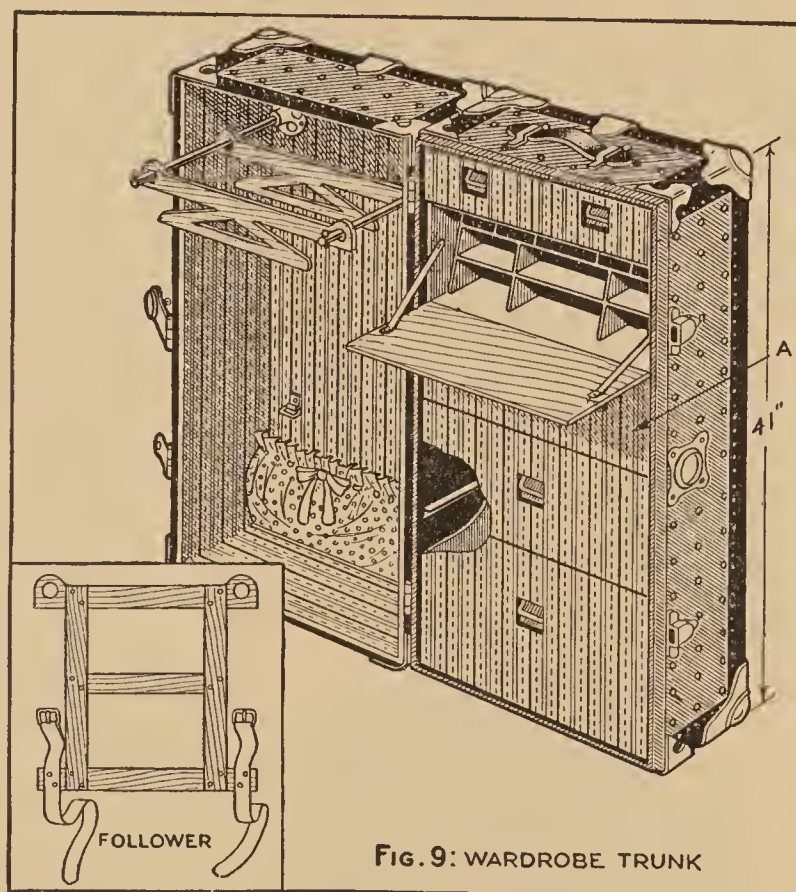


FIG. 9: WARDROBE TRUNK

This Illustration Shows a Fiber-Covered Trunk, the Interior Arrangement of Which may be Altered to Suit Individual Requirements

heads being countersunk to prevent a bulge on the outside. The projecting arms, which carry the clothes hangers, are made of 3/8-in. iron rod. Two 8-in. lengths of rod are required for each arm. One end of the arm is threaded to screw into the fitting, and the two sections of rod are joined by a knuckle, as illustrated in Fig. 10. The outer end of each arm has a hole drilled through it, and a small ball-head pin, taken from a pair of hinges, is inserted to prevent the hangers from slipping off.

The clothes hangers are best made of three-ply veneer, cut to the form and

dimensions shown in Fig. 11. The veneer will not crack or warp as readily as straight-grained wood. About nine hangers will be needed, and these can all be sawed out at one time, if a bandsaw is available.

To hold the clothes securely in place, the follower, shown in Fig. 9, is placed on the arms, after all the hangers have been put in position. Two straps are riveted to the bottom of this follower, and pass through buckles which are attached to the back of the trunk. The tongues are removed from the buckles, Fig. 12, so that the straps can slide through them and be pulled up tight before the trunk is closed.

The drawers are supported by strips of $\frac{1}{2}$ -in. angle iron, riveted to the trunk before the covering is applied. The bottom of one section is equipped with a shoe, or laundry bag, made of the same material as the lining of the trunk. The bag is hemmed all around, and, being considerably fuller than the width of the box, it is gathered at the top and provided with a drawstring, or an elastic band, as shown in Fig. 13, which keeps the shoes or linen in place.

The top drawer may be fitted with a padded compartment for jewelry or other

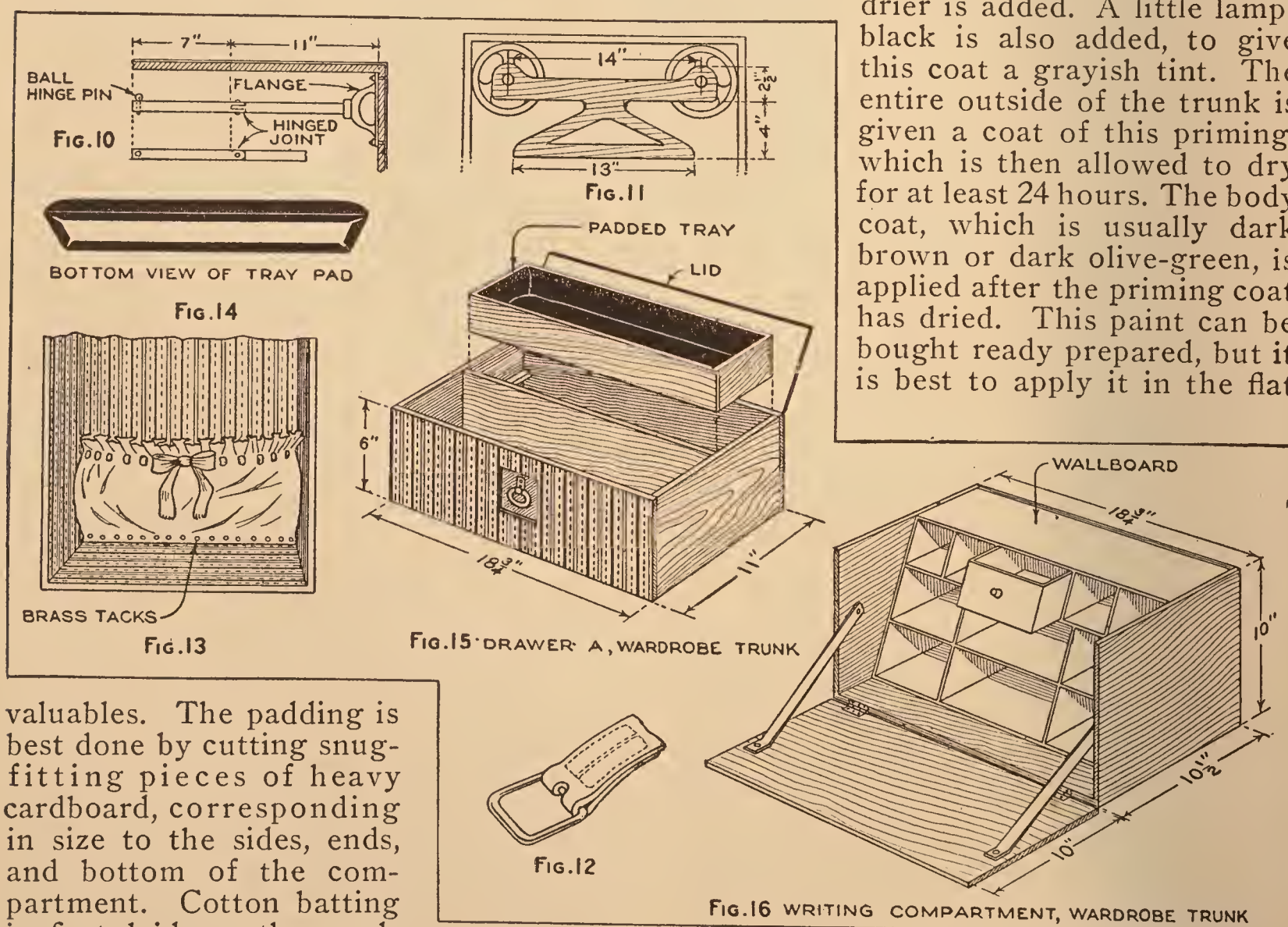
covered with muslin, which is glued to the underside of the cardboard, as in Fig. 14. A piece of dark-colored velvet, or similar material, is next applied over the muslin and glued in the same manner. The padded compartment is placed at the rear of the drawer, as shown in Fig. 15, so as not to attract attention when the drawer is opened, or the trunk left unlocked. Each drawer is fitted with a suitable handle or drawer pull, for convenience in opening.

Figure 16 illustrates the desk compartment, which may be added if desired, although the space it occupies may be devoted to the storage of clothing or other belongings.

When the trunk is packed, the pins in the ends of the horizontal arms supporting the clothes hangers are removed, and the follower is put in place; this is pulled up tightly, the straps buckled, the pins replaced, and the arms turned inward, thus holding all the clothing firmly in place.

The canvas-covered trunk described in Part I, is painted before the application of the slats and metal fittings, with a priming coat consisting of 2 lb. of white lead ground in oil; this is thinned with turpentine, and a small amount of japan

drier is added. A little lamp-black is also added, to give this coat a grayish tint. The entire outside of the trunk is given a coat of this priming, which is then allowed to dry for at least 24 hours. The body coat, which is usually dark brown or dark olive-green, is applied after the priming coat has dried. This paint can be bought ready prepared, but it is best to apply it in the flat



valuables. The padding is best done by cutting snug-fitting pieces of heavy cardboard, corresponding in size to the sides, ends, and bottom of the compartment. Cotton batting is first laid on the cardboard to the required depth, after which it is

While the Fittings Shown Are Only Suggestive, They will be Found Very Suitable for General Use and will Meet the Needs of the Ordinary Journey Excellently

and afterward give it a coat of varnish. The flat color, if it is used, is known as color ground in japan, or gold size; it is thinned down with turpentine, to which a few drops of raw linseed oil have been added as a binder. A very neat job can be made by painting the canvas brown or green, and then painting the galvanized iron or fiber fittings black,

leaving the brass corners, locks, and clips bright. No paint is placed on the wood slats, which are given two coats of orange shellac. The entire trunk is then given a coat of the best varnish.

If a fiber-covered trunk is to be painted, the priming coat is unnecessary, the color coat being applied directly to the fiber and finished as described above.

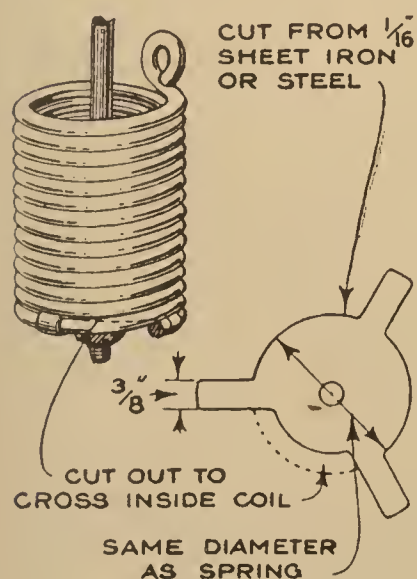
Improving the Drawing Board

Except for its firm and level bearing surface, the sole value of a drawing board lies in the trueness of its edges, yet this is the feature that is least protected. Hence the edge of the unmounted drawing board loses some of its accuracy after a time. When the board is of pine or other soft wood and made of several pieces this is particularly likely to happen.

To render the edges of a drawing board absolutely accurate and to protect them from damage, an angle strip of brass, aluminum, or other metal, sufficiently heavy to be almost inflexible, is applied to the edges of the board. One edge of the angle is flush with the board surface on one side, and that on the opposite side rests on the surface of the board. When sufficiently true, the latter edge can be used as a working base for triangles, and when the T-square is used, one end will be slightly elevated so that the possibility of blots is reduced. The metal strips are fastened to the board with small wood screws, which are countersunk.

Repairing Cycle-Seat Springs

Motorcycle and bicycle-seat springs usually break at the lower end, near the eye; when this occurs, a very satisfactory repair may be made as shown in the drawing. A piece

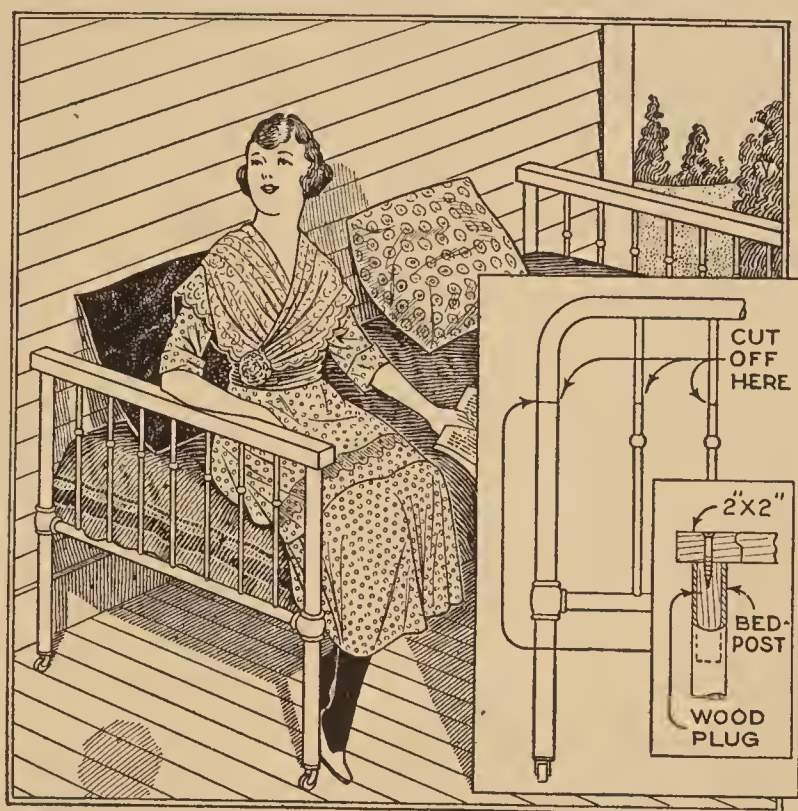


of sheet iron or steel, about $\frac{1}{16}$ in. thick, is cut and filed to the shape shown; this is forced between the last two coils, and the lugs are bent over the bottom coil. When the bolt is fastened, the spring will be as satisfactory as before, and if the piece is en-

ameled to match the spring, the repair is barely noticeable.

Couch Made of Iron Bedstead

An old iron bedstead can be converted into a day bed, or porch seat, by merely reducing the height of the head and foot. Measuring from the bottom up, the center rods are cut off with a hacksaw so that



By Cutting Down an Old Bedstead a Serviceable Day Bed or Porch Couch is Obtained

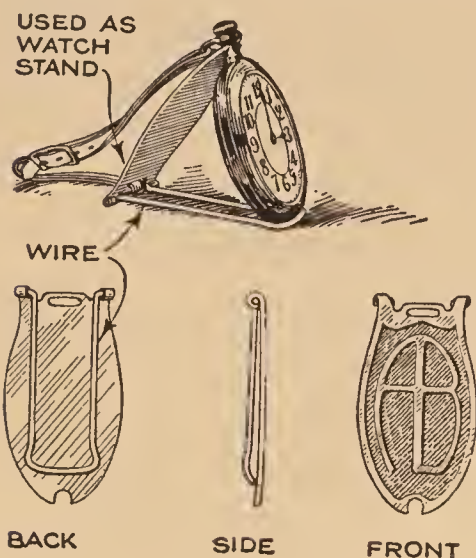
they are about the same length as the posts. The head and foot posts should previously be cut to such a length that when completed they will form comfortable arm rests. Tight-fitting wooden plugs are driven into the posts, to which the wooden crosspiece is fastened with long screws; this piece should be of hard wood, about 2 in. square, with holes drilled about halfway through from one side.

Making Parchment Paper

Paper that has the appearance of parchment may be made by soaking it in a bath of dilute sulphuric acid. Add one part of the acid to two, three, or four parts of water; immerse the paper for a few seconds in this solution, and then wash it in weak ammonia. When making the first bath, care should be taken to add the acid to the water; never pour water into acid.

Combined Watch Fob and Stand

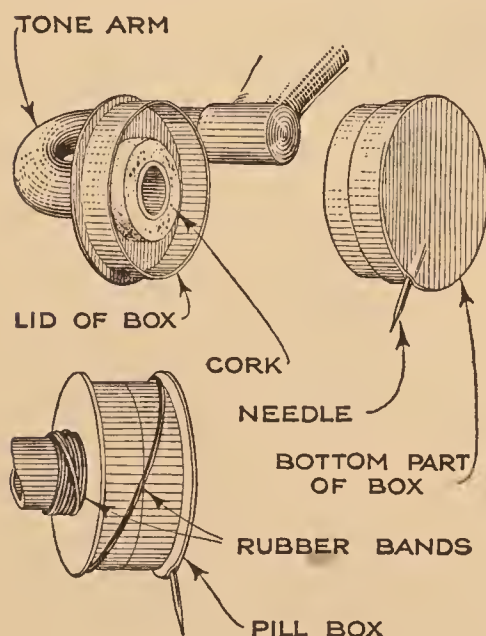
A watch fob that serves as a stand for the watch is easily made from sheet metal, as shown in the drawing. The fob is laid



out with a semicircular opening at the bottom sufficiently large to accommodate the watch stem. Two ears are provided at the top, and these are bent over to form bearings for the wire support, the end of which has a slight curve to prevent the watch from slipping. A horizontal slot is provided in the top of the fob for the strap.—E. E. Lakso, Toledo, Ohio.

Pill Box as a Sound Reproducer

Having trouble with the reproducer of his phonograph, the user returned it to the factory for readjustment. In the meantime, desiring to use the machine, he rigged up a reasonably satisfactory substitute from an old pill box and a few rubber bands.



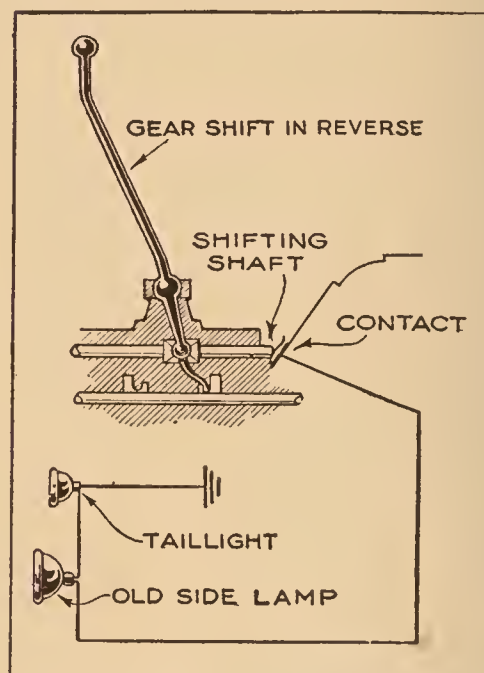
A hole was cut in the lid of the box large enough to slip over the end of the tone arm. Two or three rubber bands were wrapped around the metal arm to prevent the box from moving, and to hold it solidly; then a hole was bored through a piece of cork, which was placed over the tone arm and inside the box lid to lessen vibration. A hole was made in the lower part of the box rim to take a needle, and the two parts of the box were put together and held with a rubber band. Using a loud-tone needle, such a reproducer will deliver about the same volume of sound as is obtained with a fiber needle in the original reproducer.—Chester Cooper, Glennville, W. Va.

Saving Children's Clothes

Coasting down the slides in playgrounds is exceedingly hard on the children's clothing, making repairs frequent, and increasing the household budget. By providing the children with a piece of old carpet, tough cloth, canvas, or leather, about a foot square, the wear from this source is practically eliminated. A strap for carrying and to prevent the piece from slipping when in use, may be fastened to one side.—J. H. Rodgers, Montreal, Que.

A Rear Spotlight for the Automobile

For backing into unfamiliar places, or out of a park after nightfall, an automobile driver arranged an old side light at



the rear of the machine in such a manner that, when the gear shift was thrown into reverse, the rear lamp would be lighted and illuminate the ground back of the car. A strip of copper was insulated from the ground circuit by attaching it to a piece of fiber; this arrangement was attached to the clutch handhole cover in such a way that when the gears were shifted to the reverse position, the gear-shifting shaft would come into contact with the copper and complete the circuit to the rear lamp.—G. E. Wilson, Norfolk, Nebraska.

Planting and Caring for Young Trees

Many a fruit tree is planted each year, to waste its vitality in trying to sustain life in sod, and poor run-out land; this is the commonest error. The tree grows by inches, if it grows at all, where it should grow by feet; it is dwarfed and unthrifty. Planted in a cultivated garden, trees usually do well, planted in uncultivated land they do not.

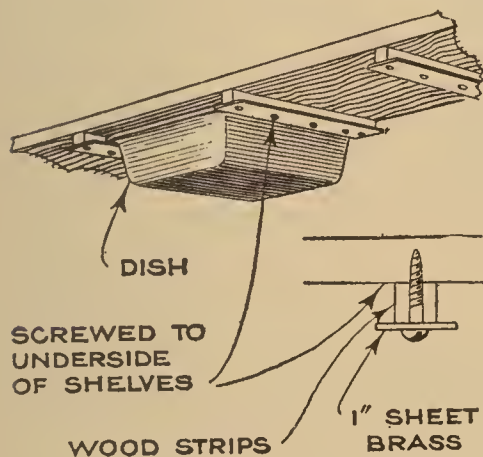
It is all a question of nourishment. This is provided by cultivation, which makes plant food available, and, when needed, by applying chemical, or other, fertilizer. The spot where the tree is planted should be well spaded and the soil

pulverized. A circle, the radius of which is roughly determined by the age of the tree at the rate of $1\frac{1}{2}$ ft. for each year of growth, should be cleared of grass and other vegetation, and kept cultivated by using a pick. After the area is well cultivated spread a straw mulch over it; straw manure is the best. If the mulch is applied when the soil is loose, it will probably remain so.

Building a mound around the base of the tree is another common error, as mounding carries moisture away from the tree; the area around the tree should be slightly dished toward the center. Sometimes, even when other conditions are favorable, a tree does not respond to cultivation; this is remedied by applications of sodium nitrate at the rate of 2 oz. for each year of its age. The fertilizer is scattered on the ground a little farther out than the branches reach, and the earth is saturated with water to wash the chemical down to the roots.—John T. Bartlett, Boulder, Colo.

Increasing the Capacity of Shelves

The storage space of pantry shelves can be increased by almost half by keeping cooking utensils, dishes, and crockery underneath the shelves, as shown in the drawing. Wooden strips, $\frac{1}{2}$ in. square, are screwed to the underside of the shelves and strips of stiff sheet brass, or galvanized iron, 1 in. wide, are attached to the underside of the wooden battens to form supports for holding dishes and other utensils by the rim, as indicated.



Handkerchiefs of Tracing Cloth

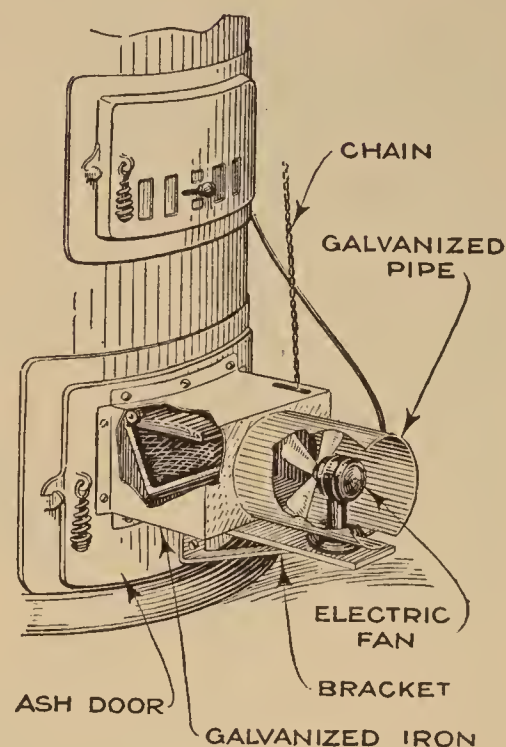
By freeing tracing cloth of the coating with which it is covered, the fabric can be used for making handkerchiefs, and other articles to which linen of this texture is usually applied.

The only treatment required to make the old tracings usable is to soak them in cold water overnight and then boil them, the water being changed several times. Any ink, stains, and other spots that may be on the tracing will come off with the coating.

A Forced Draft for the Furnace

When heat is desired in a hurry, but the furnace fails to draw well, the forced-

draft arrangement shown in the drawing will generally accomplish the desired results. An electric fan is mounted on a bracket fastened to the door of the ash pit. A sheet-metal hood, that fits over the ash-pit door, has a circular pipe fitted into it, large enough to accommo-

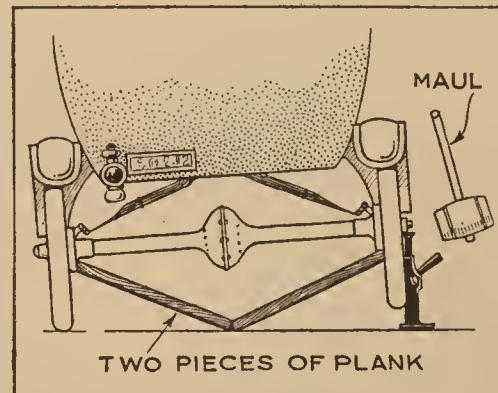


date the fan. The whole assembly should be mounted in such a manner that it will not interfere with the door movement when the ashes are to be removed. The fan should not be operated at full speed; the lowest speed being sufficient to bring the duller fire into renewed life in a short time.—W. B. Bennett, Honesdale, Pa.

Improvised Toggle Aids Removal of Wheels

Two 3-ft. sections of plank can be combined into a toggle for the easy removal of automobile wheels that are stuck to the axle, for removing a bent or rusted rim, and in an emergency, for straightening a bent axle or axle spindle. The toggle is made by butting the ends of the pieces together when the car is

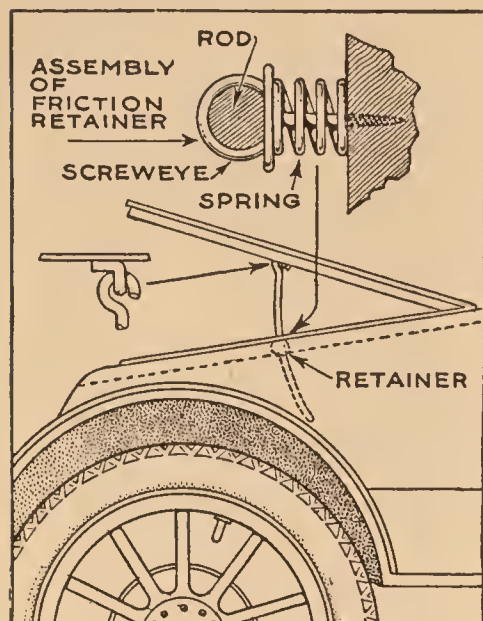
jacked up, as shown in the drawing. Lowering the car causes it to exert a powerful pressure against the wheel. If a wheel is to be removed, the axle end should be hammered with a wooden maul or heavy piece of wood.



¶ Undiluted cresol applied to an enameled surface and allowed to stand for a half hour will remove the enamel.

Friction Lock for Roadster Deck Cover

The rear deck, or compartment cover, on most roadster-type automobiles requires one

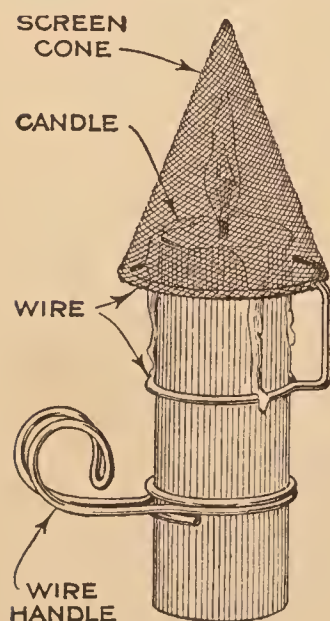


hand to keep it elevated when removing or storing tools inside. A simple friction lock, that keeps the cover in any position and permits free use of both hands, is shown in the drawing.

A section of round steel rod is curved and attached to the underside of the cover by means of the eye joint indicated. Between the rod and the frame, into which the lid fits, a short stiff spring is placed, held by the screw-eye through which the rod passes. The spring bears against a washer, which in turn presses on the rod, and provides sufficient friction to maintain the cover in the desired position. The tension can be regulated by screwing the eye deeper into the lid framing.—G. A. Luers, Washington, D. C.

Gauze Guard Makes Safety Candle

By applying the principle of a miner's safety lamp, an ordinary candle can be used with little or no danger where an open flame is permissible, but ordinarily dangerous on account of the combustibility of surrounding materials or buildings. As shown in the drawing, a cone is made from a piece of very fine wire mesh, and a piece of stiff wire, bent to the shape shown, is provided for supporting the cone and holding it to the candle. A wire handle for carrying the candle may also be made. The screen should be placed over the flame and lowered as the candle is consumed.—Howard W. Roper, Milwaukee, Wis.



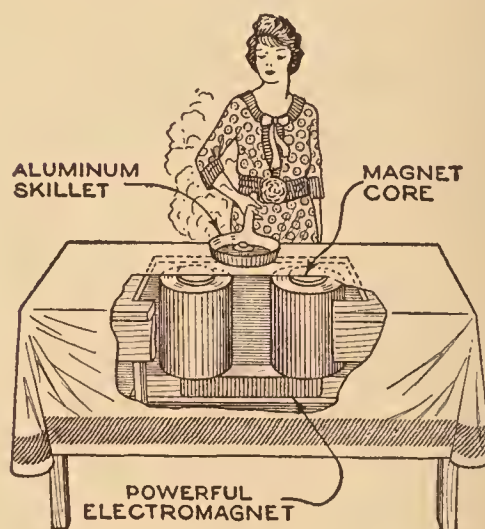
Always put a piece of heavy paper between a clamp and finished work, to avoid bruising.

Forcing Plants with Steam

Plants of all kinds expand their blossoms much more rapidly when given an occasional steam bath. A framework, large enough to cover the plant to be treated, is made and covered with cloth. Steam is generated in an ordinary tea-kettle on a portable stove, and admitted under the covering through a tube attached to the spout of the kettle. The length of time a certain plant should be steamed, depends upon the development of the buds, and different plants require longer or shorter treatment.—S. Leonard Bastin, Bournemouth, Eng.

Frying Eggs over an Unheated Table

The entertainer who can get hold of a powerful electromagnet, as, for example, the field of an old-fashioned two-pole generator, will be able to arrange an exhibition that will puzzle many who consider



themselves well-informed on electricity. He has before him what appears to be an ordinary wooden table. He announces that he will fry eggs over it in an aluminum skillet. Some matches may be scattered over the table

to prove that it is not heated, and spectators invited to satisfy themselves of the absence of heat by touching the table. After cracking and dropping an egg or two into the skillet, the latter is held a few inches above the table, and the eggs are speedily fried. An iron frying pan could be used, but the aluminum article is more effective, as no one can claim it is "magnetic."

The explanation is, that under the table top are the two powerful magnetic poles which are energized with ordinary alternating current. The lines of magnetic force between the poles will, of course, penetrate any nonconducting material, such as wood, without the production of heat. But, when any sheet metal, such as the skillet, is held in the magnetic field, the rapid alternation in its direction, produces electric currents in the metal, which are known to motor designers under the name of "eddy currents." These currents, tra-

versing the metal frying pan, have no other effect than to heat it by the ordinary process of heat production whenever a current encounters resistance. The fact that aluminum is nonmagnetic reduces the heating effect somewhat, as the lines of force are "crowded out" of the aluminum instead of being "drawn in," as they would be with an iron skillet. However, if the magnet is sufficiently strong, there is still enough heat to fry the eggs. If there is too much, the skillet can be held a little farther above the "stove," that is, a little farther out of the direct line between the magnet poles. The matches on the table will remain unlighted, but caution must be taken to prevent bringing the skillet against them or they will ignite from its heat.—Curtis Ralston, Chicago, Ill.

Writing Music with Carpenter's Pencil

When writing music in manuscript form, I use an ordinary soft-lead carpenter's pencil, sharpened to a flat edge. With this tool, neat and easily readable manuscript can be turned out at a considerable saving of time over the old method with its eye-straining hieroglyphics. With a little practice, good speed can be attained and duplicate copies can be turned out at once by the use of carbon paper.—Howard P. Albright, Albany, N. Y.

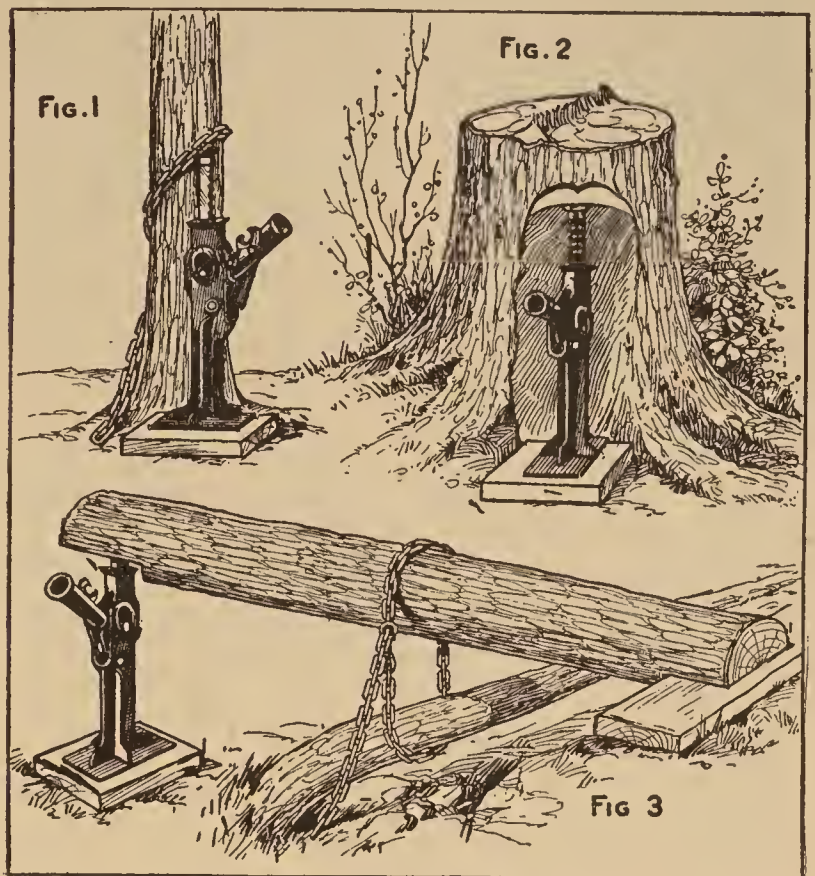


Jack Aids in Clearing Land

An ordinary ratchet jack makes an effective tool for pulling roots and stumps from cleared-off land, and for uprooting small trees, as shown in Fig. 1. Figure 2 shows a method of pulling stumps; a recess is cut in the stump for the jack to bear against. In the case of large stumps, it would possibly be better to crack it into several pieces with stumping powder and extract the pieces in the same manner. For removing the main roots of a tree, they are cut off as close as possible to the stump and pulled out of the ground by the method shown in Fig. 3, an excavation around the root being necessary to place the chain in position.

Pulling stumps, instead of burning them,

has the decided advantage of leaving the ground in good shape for plowing, the humus is not burned out, and if the soil



Pulling Up Stumps, Small Trees, and Roots with the Aid of a Track Jack Leaves the Ground Ready for Immediate Plowing

is clayey, it will not be burned hard as brick.—D. C. Chapman, Portland, Ore.

Typewriting on Labels

Owing to the difficulty of holding labels on the platen of the typewriter, and being aware that hand-written prescription labels depended upon the penmanship of the writer for their legibility, a druggist evolved the idea shown in the drawing for typing his labels. Four diagonal slits were cut in the center of a letter-sized sheet of paper, into which the corners of the labels were inserted.



The sheet was then fed into the writing machine in the usual manner and brought into position for writing the directions on the label.—F. Rickey, Geneva, N. Y.

☛ Hair cracks in hardened pieces quickly show up if the work is oiled, the oil wiped off, and the surface of the work chalked. The oil soaks through the chalk, thus betraying the presence of the cracks.

A Side-Wheel Motorboat with Automobile-Type Drive

BY L. B. ROBBINS

ONE of the simplest methods of propelling a boat in shallow water is by side or stern wheels and, while the latter is a little awkward to construct and operate, the former can be arranged with but little difficulty by utilizing the rear end of an automobile as the driving element and attaching paddles to the wheels themselves. Any motor of suitable power can be used as long as it can be properly connected to the driving shaft. The engine is mounted in the bow so that the paddles will be just aft of the center of the boat.

Where convenient, the axles are set in notches cut in the gunwales, and the forward end of the drive shaft is supported on a pillow block in the manner shown in Fig. 1; this should line the whole up with the engine shaft, although some deviation is permissible if a universal joint is used. Be sure, however, that the axles are at right angles to the sides of the boat and at such a height that the rims of the wheels will just clear the water. With a 24-in. wheel, that would mean that the center of the axle should be at least 13 in. above water level; 14 in. would be better, and allow for settling when the boat is loaded. Radius and brake rods should also be set in notches cut in the gunwales, to hold them in position; these openings may be closed with metal or oiled canvas, to prevent water from splashing aboard.

In the event that the boat is wider than the width of the axles, they must be extended to make up the difference; a simple

blocks of the type shown in Fig. 3. An extra pair of axle shafts, brake drums, and roller bearings will be required. The extra shaft is connected to the original one by a collar which screws on the hub in place of the hub cap, and receives the tapered end of the extra shaft in the manner shown. Setscrews and keys are provided to make the connection secure. The outboard ends of the shafts are equipped with a roller bearing and brake drum, the latter being fitted into the gunwales as already explained. A grease ring should also be set against the inside opening of the extra brake drums, to retain the lubricant of the roller bearings.

Six sheet-metal paddles are made for each wheel, according to the drawing in Fig. 4; these are designed for a 24-in. wheel. The base of the paddles is bolted to the rim of the wheel, the rim being first drilled so that the paddles, when placed, will be equidistant around the circumference of the wheel. See that the paddles are strong enough to stand the strain imposed upon them, and that sufficient clearance is allowed between them and the sides of the boat. The wheels are keyed to the shafts in the same manner as on the car. A water shield, of metal or canvas, is provided over each wheel to prevent splashing, as in Fig. 1.

When the water is calm and the paddles are in the water on both sides at the same time, the action of the differential will remain even, and both wheels will turn at the same speed. Lead ropes are run from the brake rods back to the steersman's position; these are connected to levers, and when one is pulled slightly, the consequent braking action slows the paddle wheel down on that side and the boat turns in the direction of the retarded wheel. By manipulating these levers

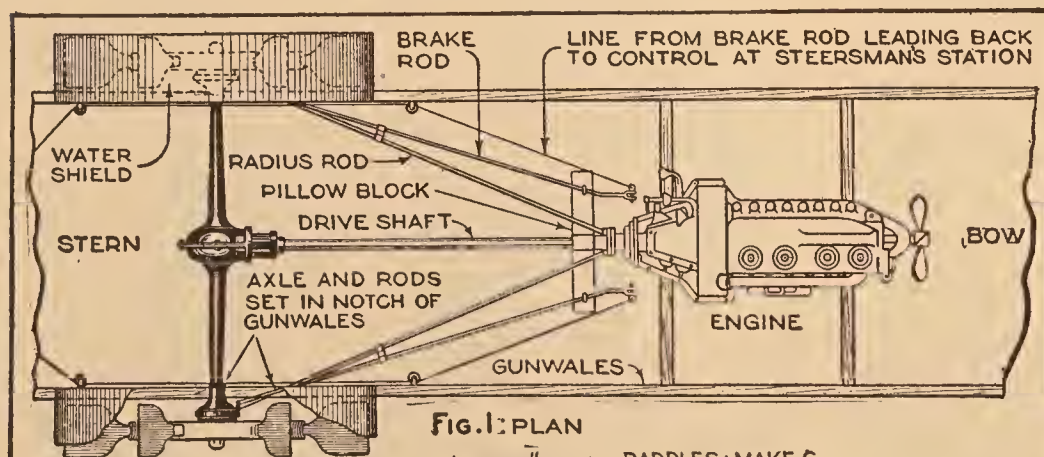


FIG. 1: PLAN

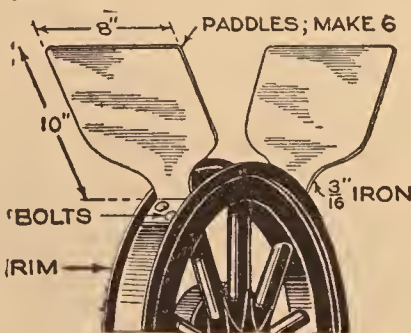


FIG. 4: REAR WHEEL SHOWING PADDLES

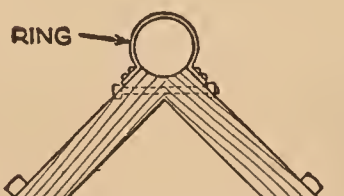


FIG. 3: PILLOW BLOCKS FOR SUPPORTING BRAKE DRUMS

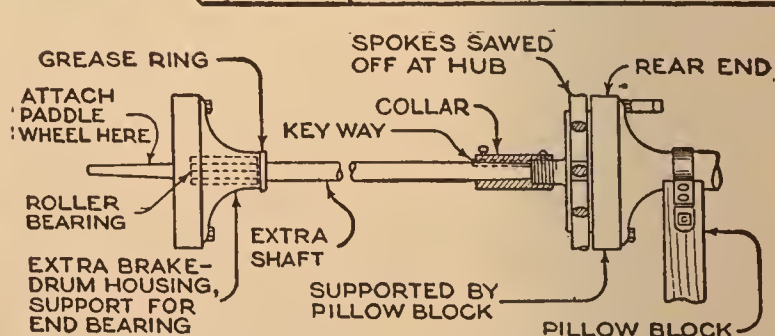


FIG. 2: HOW TO CONNECT THE TWO SHAFTS

The Only Satisfactory Means of Propelling a Boat in Shallow Water Is by Side or Stern Wheels; the Former can be Arranged by Utilizing the Rear End of an Automobile and Attaching Paddles to the Wheels

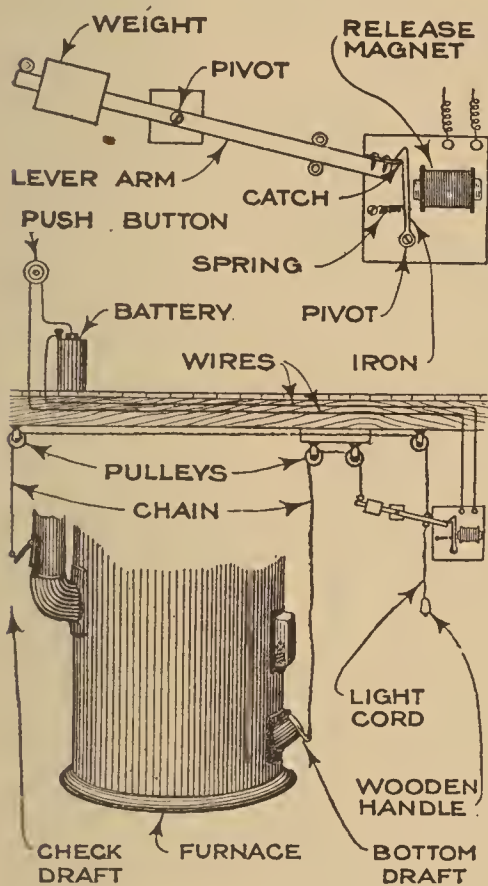
way of doing this is shown in Fig. 2. The brake drums are supported on pillow

properly, no rudder is needed in either forward or reverse speeds. If the action

of the differential is likely to be impaired because of rough water, or uneven loads, simply pin one of the small rotating differential gears so it will not turn, and both axles will revolve as one shaft, but in this case the brakes will have no effect except to stop both paddles.

Push Button Opens Furnace Draft

By merely pushing a button, the drafts of a furnace can be operated, without descending to the basement.



A lever, 14 in. long, is pivoted at its center, in a position near the furnace, where it will not interfere with the head-room. A light chain is run from the check-draft door to one end of the lever, while another chain connects the opposite end of the lever to the bottom draft. A weight is placed on the

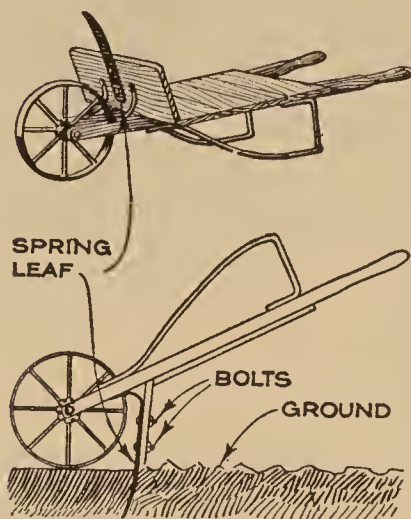
lever arm, at the end that is connected to the bottom-draft door, to act as a counter-weight.

The device is operated by a simple spring-actuated catch, which engages with the end of the lever when it is pulled down to check the draft. A light cord, with a handle attached, can be provided to set the device, if it is located above reach. When it is desired to open the draft and start the fire, pressure on the push button causes the electromagnet to pull back the latch, thereby releasing the lever, which closes the check draft and opens the bottom draft. The same apparatus may easily be adapted to be operated automatically by means of an alarm clock.

Special care should be taken to avoid the interchange of oxygen and acetylene hose or piping, as this might result in a mixture of these gases which would be highly explosive. The practice of using threads of a different hand for each pipe is recommended.

Garden Plowed with Wheelbarrow

The sketch shows how an ingenious gardener quickly converted an ordinary garden barrow into a serviceable culti-

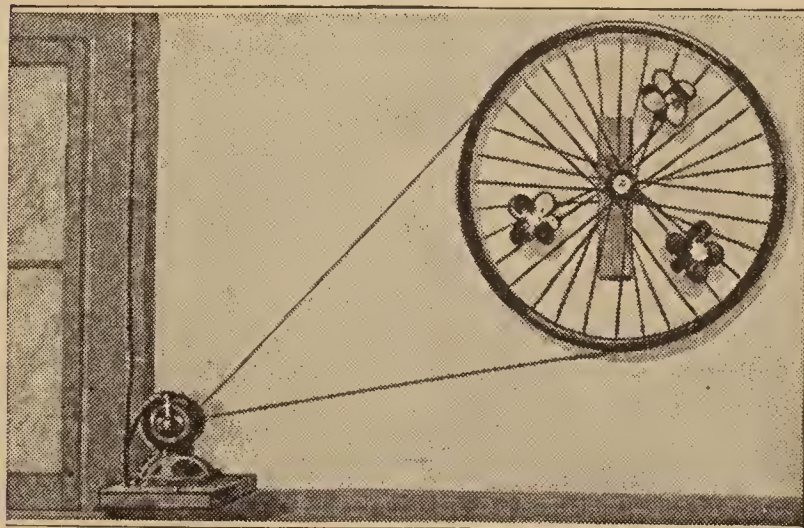


vator. A leaf from a broken automobile spring, 2 ft. long, was secured to the dash of the barrow by means of two short bolts, put through holes drilled for the purpose. The other end of the spring was cut to the shape of a narrow cultivator shovel,

and sharpened. To use the plow, the barrow was simply turned upside down and pushed along the row after the manner of a wheel hoe. Later, two smaller shovels, made from leaves of a seat spring, were bolted one on each side of the large one, to form a weeder. The cultivator does not interfere with the regular use of the barrow.—H. F. Grinstead, Columbia, Mo.

Device Amuses Children While Their Hair is being Cut

A Kentucky barber has installed the arrangement shown in the photograph in his tonsorial establishment, for entertaining the youngsters who are compelled to submit to his ministrations. An old bicycle wheel is mounted on the wall where the children cannot avoid seeing it; the wheel has attached to it several brightly colored pinwheels. The device is driven

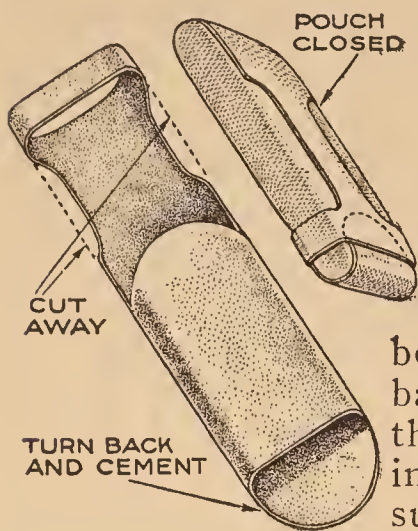


A Barber, Knowing the Aversion of the Average Child to a Hair Cut has Rigged Up the Device Shown for Entertaining Them as He Wields the Shears

by a small electric motor, as shown. Thus, the barber is able to attract little Johnny's attention to something more entertaining than the usually disliked hair cut.—J. E. Reid; Bellevue, Ky.

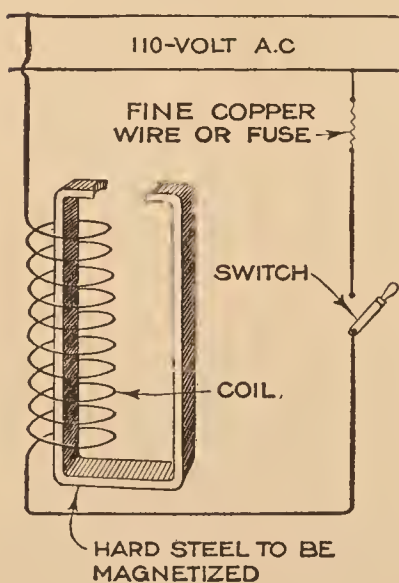
Tobacco Pouch Made from Inner Tube

A serviceable and convenient tobacco pouch, for the man who "rolls his own" or smokes a pipe, can be easily made from an 8 or 9-in. length of old inner tube. The tube is cut away at one end to make a flap, which is coated with rubber cement, turned back, and cemented to the tube, as indicated in the drawing. After sufficient space has been allowed for forming the pouch proper, the remainder of the tube is cut away on the dotted lines, in the manner shown. When the pouch is filled with tobacco, the upper flap is brought over, and the ring at its end is snapped over the opposite end, as shown. —Andrew Crowe, S. Manchester, Conn.



Making Permanent Magnets by Use of Alternating Current

In the amateur's laboratory it often happens that he desires permanently to magnetize steel parts, but is not able to do so without means of rectifying the commonly used alternating current. This difficulty can be easily overcome if the coil used to magnetize the parts is placed in circuit with a fairly heavy fuse, of 5 or 10 amperes, or with a piece of light copper wire, as shown in the sketch. When the switch is closed, the fuse, of course, is blown, but the instantaneous surge of current in the coil is very great, and the break so sudden that the steel is left magnetized. The result is secured only if the current happens to break near the peak of a wave, or alternation; if not successful the first time, the process must be repeated. —A. Swenson, Okmulgee, Okla.



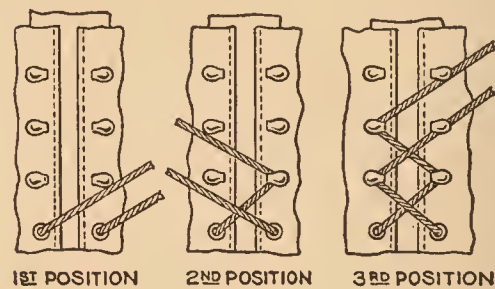
☐ A flush-driven staple can be pulled if a nail is bent at the tip and driven under the staple. Draw the nail with a claw-hammer.

Tape Measure Used as Skirt Marker

The home dressmaker always has her tape measure handy, and she will rejoice to know that she possesses, at no cost, an excellent device for marking a skirt evenly around the bottom. The conversion, which is accomplished by inserting a steel corset stay into one end, does not interfere with the usefulness of the measure. With this ever-at-hand skirt marker it is a simple matter to insert pins at regular intervals in the material at the required height. —Mrs. Deane Newcomb, New York, N. Y.

Lacing Boots with One Hand

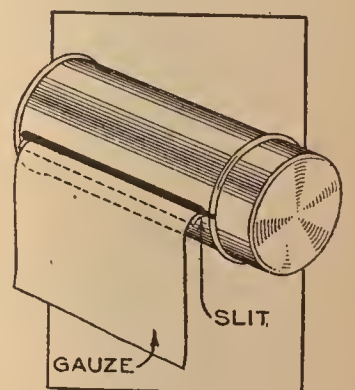
When lacing boots or leggings which have a long line of hooks, take one lace between the thumb and index finger, and the other between the index and second fingers, allowing the laces to slip as required. The laces are brought to the



first position and then hooked under the first hook, as in the second position. With a twist of the wrist, catch both laces under their respective hooks, as illustrated in the third position, continuing until the top is reached, and the lace tied. —J. McCormack, Haliburton, Ont.

A Sanitary Gauze Holder

Antiseptic gauze is not likely to remain sterile very long after the package has been opened, unless precautions are taken to keep the hands from touching the roll. A sanitary holder can be easily made to any suitable dimensions, from a tin can having a lid. A slit is cut the entire length of the can, and the rough edges are bent out slightly to prevent the gauze from catching as it is drawn through. A few inches of the gauze are unrolled and the roll is placed inside the can, slipping the end into the slit. The cover of the can serves to keep the roll in and dirt out. If desired, a pad kept moistened with an antiseptic solution may be placed inside the lid as an additional safeguard.





A Combined Screen and Magazine Rack

By JAMES TATE

AMONG the home adornments that may be made in the amateur's workshop, is a three-panel combination screen and magazine rack of wallboard, the front presenting the appearance of the conventional decorated screen, while the back is provided with racks for holding books and magazines.

Such a screen may be made of any suitable dimensions, those given being merely suggestive. However, for most purposes, a screen 5 ft. high, with 22-in. panels, will be found about right as regards convenience. The two end-

panel frames are made up of $\frac{3}{4}$ by $1\frac{1}{2}$ -in. material, with mortised and tenoned joints at the corners, the horizontal piece at the bottom of each panel being joined to the uprights at a point about 2 in. above the floor. Before the frame is assembled, a groove is routed along the inside face of each strip. This groove should be $\frac{1}{4}$ in. wide, and from $\frac{3}{8}$ to $\frac{1}{2}$ in. deep, to take

the wallboard used for the panel. The groove in each piece is given a coating of good glue, and the panel and frame assembled.

The central-panel frame is slightly different than the others, in that it is made about 3 in. deep, suitable racks being provided for the storage of books and other reading matter; the racks on the end panels, which are about 2 in. deep, may be made by screwing wooden brackets to the uprights, and using light wooden

strips to hold the books in place. Provision should be made, when building the rack on the right-hand panel, to see that it will clear the sides of the center section, when the screen is folded.

The left-hand panel is attached to the box-like center section by a

pair of stout brass hinges on the front edge, while the right-hand panel is hinged to the rear edge.

The front of the screen, being wallboard, can be painted and decorated to suit the taste of the builder, or it may be covered with wallpaper to harmonize with the decorations of the room. Naturally,



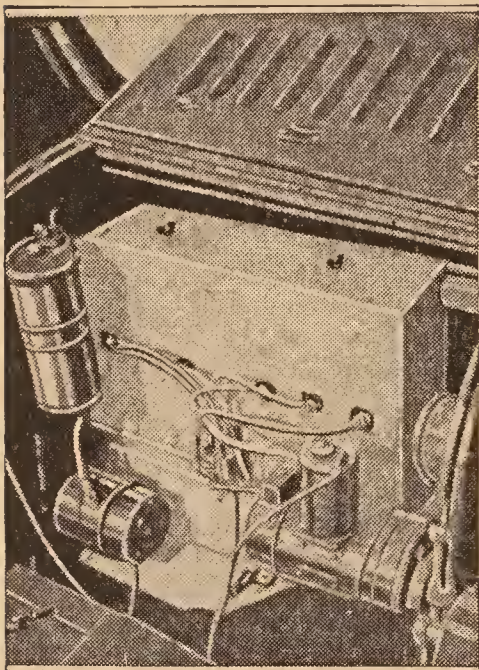
A Library Screen with Wallboard Panels That can be Decorated in Harmony with the Room: The Screen Also Serves as a Book or Magazine Rack, and Keeps Reading Matter Where It Is Easily Accessible, Yet Readily Removable from Sight If Desired

the wood of which the frame is made should be selected to correspond with the interior woodwork, although oak or birch is preferable; the latter, if a mahogany finish is desired.

The functions of such a screen are threefold: It serves as a library screen, takes the place of a reading table, or makes an appealing cosy corner, the conveniently placed book pockets keeping one's favorite books and magazines where they are accessible, yet readily removable from sight as occasion may require.

Metal Jacket for Automobile Engines

The photograph shows how the overhead-valve mechanism used on some makes of automobiles can be inclosed,



to prevent the working parts from accumulating dust and dirt, and, at the same time, reduce operating noises. A metal box to fit over the cylinder block is made, with soldered joints and square corners, as shown.

Two studs are screwed into the engine head, and these project through holes in the top of the cover, which is held in place by two wingnuts, as shown.—W. L. Peterson, Denver, Colo.

Etching Glass with Glue

The peculiar frosted appearance of some kinds of glass can be duplicated in the amateur's laboratory by means of strong glue.

Obtain some very strong liquid glue, and apply a thick coat over the inside and outside of an ordinary glass tumbler. Set the glass aside for 24 hours, until the glue becomes dry, and then place it over a heater, or close to a stove. Leave the glass there for another 24 hours, being sure that the heat is constantly maintained during the whole time. When the time is up, remove the glass from the warm spot and place it where it can cool. The glue will begin to crack, and in doing so will break off small pieces of glass from the surfaces of the tumbler.

When the glue shows no further signs of cracking, which will be a few hours after cooling, the remaining glue is washed off. It will be found that very peculiar and delicate designs have formed on the surface of the tumbler.

If the first coat of glue does not bring results, apply two more coats, after the first has dried, permitting each separate coating to dry before the application of another; then place the tumbler near the stove.

Any glass article having a smooth surface can be etched in the same manner. As no uniform pattern is produced, each piece will have a slightly different design etched upon it.—Mallory Dufur, Baltimore, Md.

Water Colors on Parchment Shades

Most workers find it more or less difficult to apply water-color paints to parchment lamp shades. The slightest trace of grease will cause the color to "ball up," so that it is practically impossible to get the colors to cover, and stick to, the material. The same difficulty is also experienced in the use of India ink. The trouble can be overcome by rubbing the surface of the parchment with powdered pumice stone, applied with a tuft of cotton.

Price Table for Filling Stations

To prevent mistakes and save time in computing the price of any number of gallons of gasoline, at any price per gallon, the calculator shown in the drawing has been installed beside the gasoline pump of a filling station. As shown, the price in dollars and cents appears on a

CYLINDER ON TRUNNIONS,

1 Gallon	.29	<p>READ ← THE ← CORRECT ← AMOUNT ←</p>
2 Gallons	.58	
3 Gallons	.87	
4 Gallons	1.16	
5 Gallons	1.45	
6 Gallons	1.74	
7 Gallons	2.03	
8 Gallons	2.32	
9 Gallons	2.61	
10 Gallons	2.90	
11 Gallons	3.19	
12 Gallons	3.48	
13 Gallons	3.77	
14 Gallons	4.06	
15 Gallons	4.35	

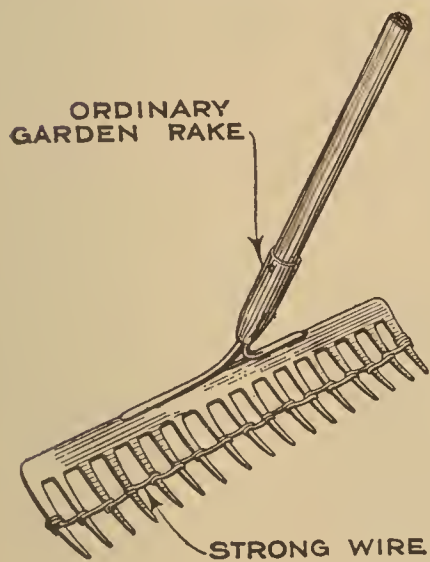
revolving cylinder which is supported between trunnions, while the quantity in gallons appears on the stationary mounting. Any number of prices can be accommodated on the cylinder, depending on its diameter, but unless many grades of fuel are carried, more than three or four will seldom be necessary.—Curtis Ralston, Springfield, Ohio.

Hulling Walnuts with Corn Sheller

The ordinary corn sheller found on the average farm makes an excellent implement for shelling walnuts, and other nuts, without the annoyance of stained fingers. The sheller should be turned slowly, and the walnuts allowed to run in one at a time, just as though they were ears of corn. The heavy nuts will fall down, while the lighter hulls will be thrown out of the machine just as the corncobs are. To make the hulling easy, the walnuts should be turning black, but should not be dried to any great extent. A pair of old gloves will prevent staining the hands when feeding the nuts into the huller

Garden Rake for Sifting Ashes

No one enjoys sifting ashes, hence it is a job that is likely to be slighted. The task is made much easier by the use of the tool shown in the illustration.

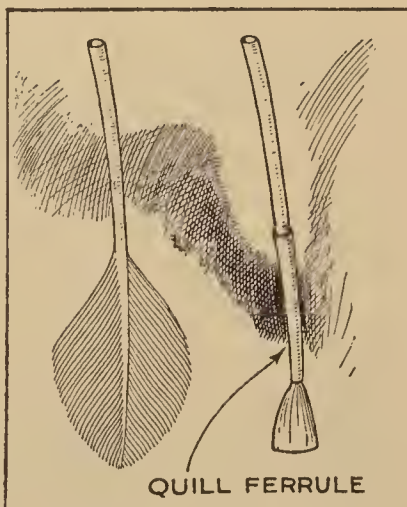


A piece of strong wire is bound along the teeth of an ordinary garden rake, about halfway up the teeth, thus furnishing an easy means of raking the half-burnt cinders from the ashpit each time the furnace is attended to.

Paintbrushes Made from Feathers

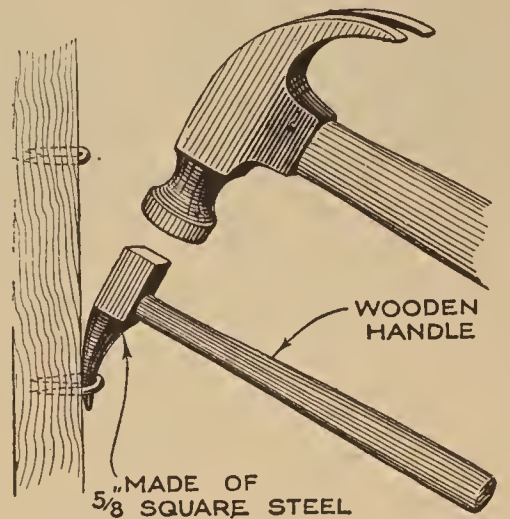
The method one lady used to keep her children supplied with brushes for their water-color work, in the absence of "regular" brushes, is shown in the drawing.

A feather of the desired size is selected, and all but one inch is stripped from the midrib, or stem. The hollow quill at the larger end of the stem is cut off and cleaned out with a piece of wire, and is then slipped over the feather to form a ferrule. Glue may be used to hold the feather in place, if desired.



Staple-Pulling Tool

When renewing the wire on a chicken corral or barb-wire fence, the greater part of the work is represented by extracting the staples which attach the wire to the posts. This tedious and exasperating labor can be pleasantly speeded up by using a special staple-pulling tool, such as shown in the drawing.



A pointed hammer is made of 5/8-in. square steel, with its point sharpened in the form of a pickax, as shown, and an eye for a handle. The point of the tool is driven under the staple with a hammer, and an upward pull on the handle withdraws the staple without bending it.

Making Bottle Mirrors

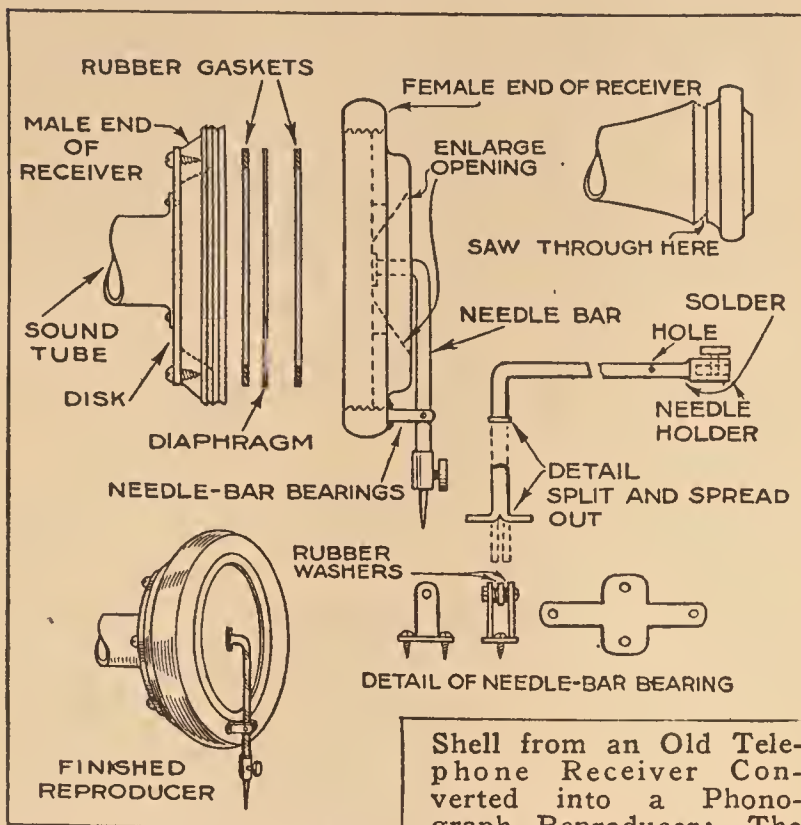
Interesting results are obtainable by coating the interior of transparent bottles with silver. Dissolve a small quantity of tartaric acid in water, and add ammonia until the mixture smells strongly of that chemical. Add calcium chloride to the solution, and warm the whole; continue to add calcium chloride, stirring well until the solution assumes a thick appearance. Permit it to stand until a precipitate is formed; this precipitate is calcium tartrate. Rinse the tartrate in clear water several times, and place it inside the bottle to be silvered. Add two or three drops of ammonia and a crystal of nitrate of silver, about the size of a pea.

Hold the vessel over a lamp, so that it is gently warmed, moving it about so that the chemicals inside will cover all parts of the surface. After a while the heat will cause the whole of the inside to become coated with a film of bright silver. Allow the bottle to cool and wash out the inside. It is then inverted and allowed to dry thoroughly, after which it is closed with a stopper and sealed with wax.

Should the first attempt to silver the bottle be unsatisfactory, it is easy to clean off the silver film by pouring a teaspoonful of diluted nitric acid into the bottle, and warming it slightly. When all the silver has been removed, the bottle is washed and the process repeated.

Phonograph Reproducer from Phone Receiver

An old telephone-receiver shell can be converted into a serviceable phonograph



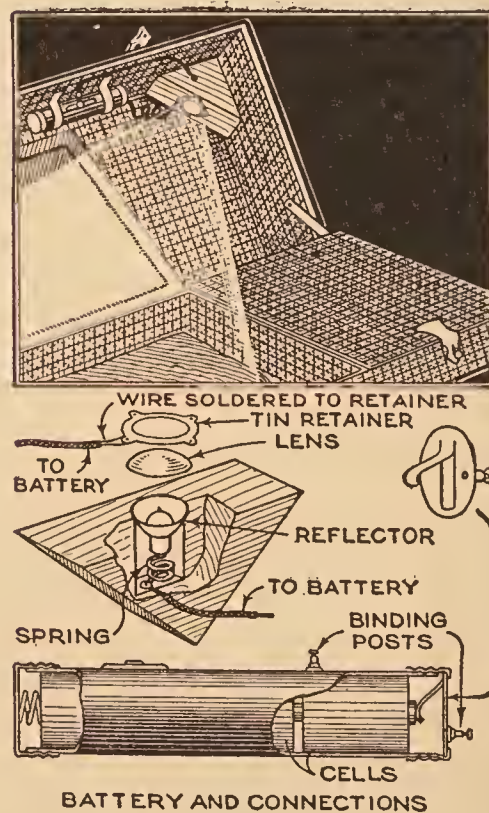
reproducer with little work and expense. The shell is sawed off about $\frac{1}{2}$ in. back of the threaded male end, and the cap, or earpiece, is unscrewed and removed. A metal plate of the same diameter as the severed end is provided and drilled at the center with a hole, $\frac{1}{2}$ or 1 in. in diameter. Over this hole a small tube to fit the gooseneck of the phonograph is attached with small rivets, or solder. Several small holes are drilled around the outer edge of the plate, and corresponding holes are drilled into the rubber, for attaching the plate with small screws. Cut out the beveled opening in the cap to at least 1 in. in diameter. Substitute for the metal diaphragm one made from a sheet of mica, or thin cardboard. A thin rubber gasket, or washer, is placed on each side of the diaphragm, to insulate it from the hard surface, and the cap is tightly screwed on.

The needle arm is made from a piece of stiff, light metal, such as German silver, and should be long enough so that when bent at right angles, as shown, the upper leg will touch the center, and the lower end will extend beyond, and clear, all parts of the cap. Split the upper leg and spread it out to form a flat base, as shown. Solder the lower end of the bar to a piece of round rod, drilled through the center to receive the needle. A small hole is drilled and tapped at the side for a small knurled-head screw, to hold the needle. A hole is also drilled through the bar at

the proper location for its attachment to the bearings with a small riveted pin or screw. The bearings are made from a single piece of stiff metal, formed and bent as shown, and attached to the edge of the cap with screws. Place a small rubber washer on each side of the needle arm, and secure it to the bearings. Cement the flattened upper leg of the needle bar to the diaphragm with a drop of sealing wax, and the reproducer is complete. Be sure the needle bar has play on its bearings, but not enough to be loose or rattle. This will require adjustment after the reproducer has been assembled and tested. —L. B. Robbins, Harwich, Mass.

An Electric Light for the Trunk

To facilitate the location of articles in a trunk, where the light usually is insufficient, the trunk can be fitted with a light plant of its own, by utilizing an electric flashlamp. A triangular block is cut from a piece of 2 by 4-in. lumber, and a hole is drilled in one side, about $\frac{1}{2}$ in. deeper than the combined length of the assembled reflector and lamp. This hole is countersunk about $\frac{1}{8}$ in., to bring the reflector flush with the surface.



A small brass spring is secured to the bottom of the hole by a screw, so that it will bear firmly against the base of the lamp when in position; this spring is connected to a wire from the battery, and another wire is soldered to the edge of the reflector. The lens is set in position, and the assembly is held in place by a retainer made from a piece of tin; this is provided with drilled ears for the fastening screws. The block is then screwed into the upper right-hand corner of the lid, as indicated.

The battery is retained in the flashlamp shell as usual, with the exception that a metal disk is substituted for the lens. A section of the disk is cut away and bent back to form a spring contact with one element of the battery and one pole of

the switch. Binding posts are attached to the second pole of the switch and disk, as indicated. The battery is held inside the trunk lid with metal straps, care being used to prevent them from contact with metal parts that would cause a short circuit. The lamp is lighted and extinguished by means of the flashlamp switch in the usual manner.

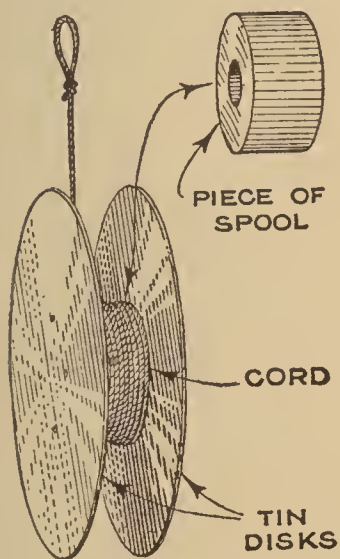
Filling Cracks in Shoes

Cracks in shoes, at a point above the small toe of the wearer, may be easily repaired with gelatin, mixed with hot water to the consistency of glue. The crack is filled with the mixture, and the gelatin smoothed down flush with the leather, whereupon one or two coatings of formalin (40-per-cent formaldehyde) are applied to the patch. The formalin has the effect of hardening the gelatin, making it waterproof, tough, and insoluble in water.—Chas. W. Waller, Chicago, Ill.

Making and Using the "Bandilore"

An East Indian toy, known as a "bandilore," is made from a piece of spool, about $\frac{1}{2}$ or $\frac{3}{4}$ in. thick, and two tin disks, about 4 in. in diameter.

The section of spool is tacked between the two disks, exactly in the center. Tie one end of a 3 or 4-ft. length of stout cord to the spool. The bandilore is operated by winding the cord around the spool, and holding the free end of the string in the hand. The toy is dropped and descends with great speed; just before the end of the cord is reached, the whole thing is given a quick upward jerk. This increases the speed and momentum of the disks so that the cord is wound in the opposite direction, and the bandilore climbs upward, the process being repeated as often as desired.

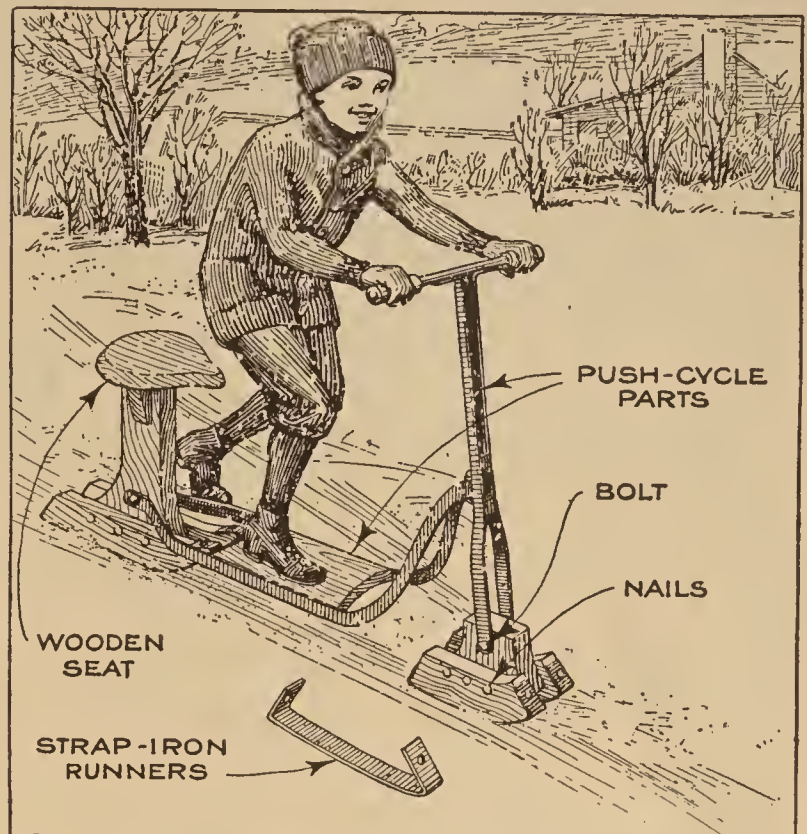


Japan Drier as Paint Medium

The use of Japan drier is recommended for mixing the paints used in coloring parchment lamp shades. This is put up and sold under various names, never by its own, as a medium for the paints used in this work.

Push Cycle Converted into Sled

By removing the wheels of a child's push cycle and attaching two sets of run-

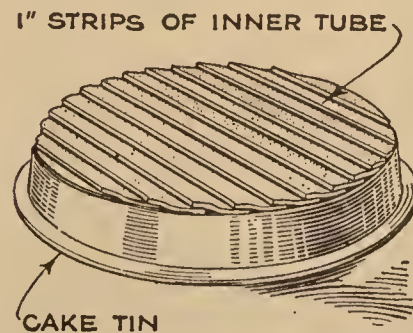


By Removing the Wheels from a Child's Push Cycle and Substituting Runners, a Novel and Serviceable Sled can be Made. The Sled is Guided like a Cycle, with Its Occupant Standing or Sitting

ners in their stead, a novel sled is the result, one that the child can stand or sit upon at his pleasure. The sled is guided as is the cycle. Each set of runners is composed of three pieces, the central pieces being made the same thickness as the width of the wheel hubs. The rear upright should be made sufficiently long to form a convenient seat pedestal. The runners are shod with strap iron.—F. E. Leitch, Brooklyn, N. Y.

A Homemade Coin Tray

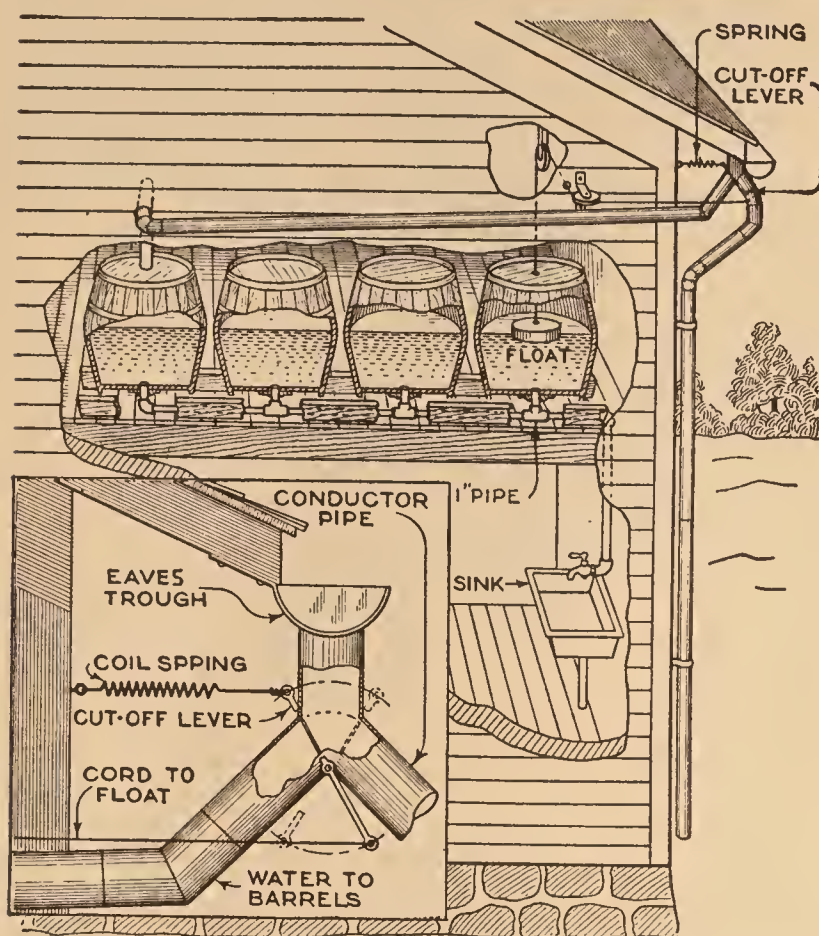
A rural merchant who had noted the difficulty experienced by his patrons in picking small change from the counter or display case, recalled to mind a coin tray he had once seen. As no such article was available in his town, one was made from a cake pan and some 1-in. strips of old inner tube.



The rubber strips were cemented to the bottom of the inverted pan, shingle fashion. When the rubber cement used for the purpose had dried, the projecting ends of the strips were trimmed off.—G. E. Hendrickson, Argyle, Wis.

A Soft-Water Storage System

A very satisfactory gravity water system for the isolated dwelling can be in-



A Satisfactory Gravity Storage System That can be Installed in the Attic of the Isolated Dwelling at Insignificant Cost

stalled in the attic at insignificant cost. The water is stored in four or five barrels, as shown; these are supported on two lengths of timber and connected at the bottom by sections of 1-in. pipe. To avoid the use of unions in the pipe line, a hole is drilled in the bottom of each barrel, and a floor flange, with a rubber gasket interposed, is attached with small bolts. Coating the gasket with shellac will prevent any possibility of leaking. Each flange is fitted with a nipple of the proper length. The pipe line having been previously laid between the supporting timbers, the barrels are lined up with the fittings and the nipples are screwed in place by turning the barrels.

A cut-off is attached directly to the eaves spout, as shown, and the water is conducted to the barrels by means of a suitable length of pipe from one arm. The regular pipe to the ground is attached to the second arm of the cut-off. To shut off the water automatically when the barrels are full, a stout cord is attached to the lever arm of the cut-off; this cord runs through pulleys to one of the barrels, where the end is attached to a float, as indicated.

The float should be suspended in such a manner that when it is about 3 in. from

the top of the barrel, the water will be diverted to the outside pipe. This is accomplished by attaching a light spiral spring to the opposite end of the cut-off lever. When the barrels are empty, the weight of the float will open the gate in readiness for the next rainfall.—F. D. Burke, Lisle, Ill.

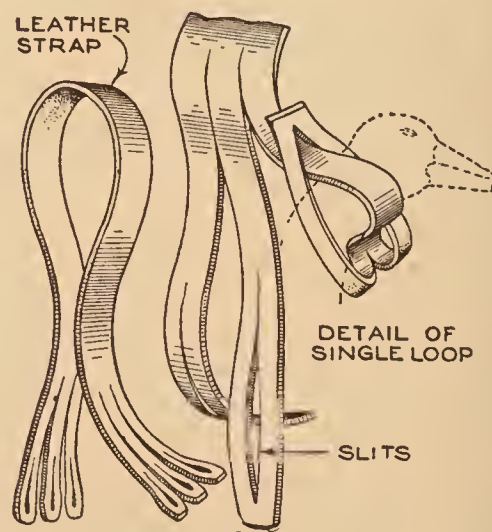
Sizing Prints in Preparation for Coloring

Photographs that are to be retouched, or colored with water colors, often show a tendency to reject the color, this being particularly noticeable on glossy prints. An application of gelatin to the face of the print makes it easy to apply the colors, which will then flow evenly under the brush.

Dissolve a small amount of white gelatin in warm water to make a jelly; this is allowed to harden into a small cake. The gelatin is applied to the print with a wad of cotton, which has been moistened and rubbed over the surface of the gelatin cake. Being colorless, there will not be any marks to show the presence of the gelatin, which is always ready, and requires no mixing.

An Easily Made Game Carrier

A simple game carrier that will meet the needs of most sportsmen can easily be



made from a piece of leather. The ends are split at uniform distances apart, a slit being cut into each of the separate straps thus obtained. In use, the slit end of the strap is turned up and the body of the strap is inserted, thus forming a loop through which the head of the fowl is placed.—Clay Hewes, Albany, N. Y.

Bent Handle on Sugar Spoon

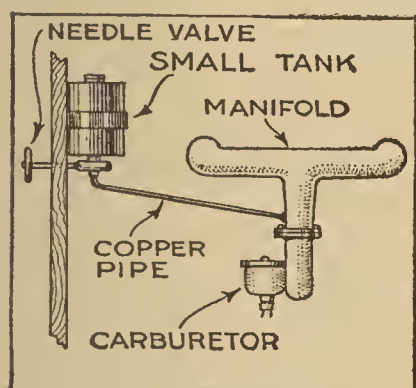
To prevent the projecting handle of a sugar spoon from being accidentally knocked from the bowl, the handle is bent so that it will hook over the edge. The spoon is easily bent by pressing the handle around some curved object, such as the neck of a bottle.—F. H. Mason, Victoria, B. C.

How to Make a Rubber-Stamp Pad

Ink pads for rubber stamps can be made at very little cost, from old felt hats and wooden blocks. Several thicknesses of felt, or similar material, are tacked to a wooden block, around the edges. Rubber-stamp ink, made by dissolving package dyes in glycerin, is rubbed into the pad with a piece of paper, until the pad has absorbed all it will hold. The glycerin will not evaporate.

A Simple Engine Primer

A simple device, which enables the motorist to prime his cylinders in cold weather without leaving the seat, is shown in the drawing. A stout can, provided with a needle valve and a filler cap, is

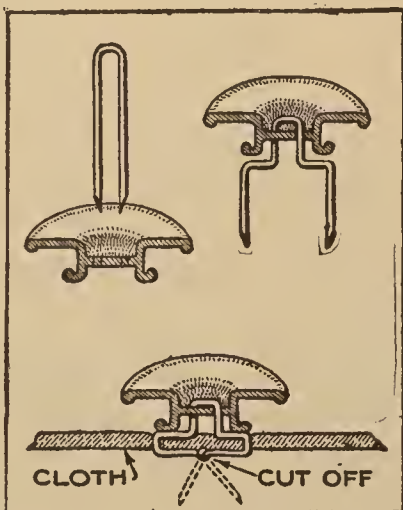


clamped to the dash, so that it is higher than the carburetor. The handle of the valve must be long enough to go through the dash; a piece of copper tubing is led from the valve and

tapped into the manifold above the carburetor. The small tank is filled either with high-test gasoline, or a half-and-half mixture of ether and gasoline. The needle valve should be closed when the engine is warm enough to run on its own mixture.—J. P. Lewis, Golden, Colo.

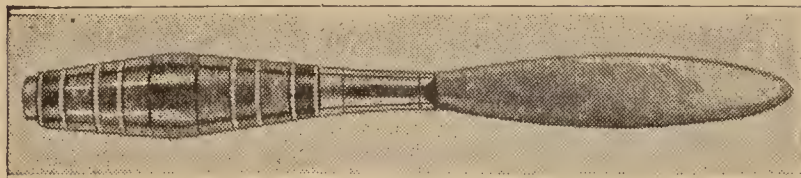
Securing Buttons with Wire

A handy way of fastening buttons to clothing is to use light wire for the purpose, copper or galvanized-iron wire being preferable. A piece of wire is cut to the length desired and bent to form a long staple, as shown; this is inserted through two of the buttonholes and bent as shown, the ends of the wire being cut to make sharp points for ease in penetrating the cloth. After the wire has been pushed through the cloth, the ends are bent toward each other, parallel with the fabric, and twisted together, any surplus wire being cut off.



Handles Made from Scrap

Scraps of different-colored fiber, transparent celluloid, and metals of different



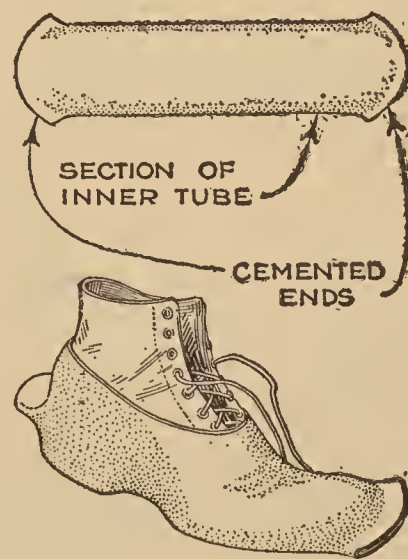
The Scraps of Material Which Accumulate around the Amateur's Workshop may be Utilized to Form Ornamental Handles of Various Kinds

color are just the thing for making ornamental handles for tools and other purposes. The material is cut into squares and a hole is drilled through the center of each, the drilled squares being placed on a long bolt and firmly held in place by the nut. The handle is finished by turning in a lathe; after the handle has been turned to the required shape, it is polished with fine sandpaper and finished on a buffing wheel, or by rubbing with a piece of leather and crocus.

Overshoes from Old Inner Tubes

A motorist who often soiled his high-priced footwear when getting out in the mud to crank his car, or to make minor repairs, provided himself with a pair of overshoes made from sections of an old inner tube.

Two 12-in. lengths were cut from the tube, the ends being cemented together and vulcanized. The overshoes were completed by making an opening near one end large enough to insert the foot. Though rather odd in appearance, they are nevertheless serviceable.

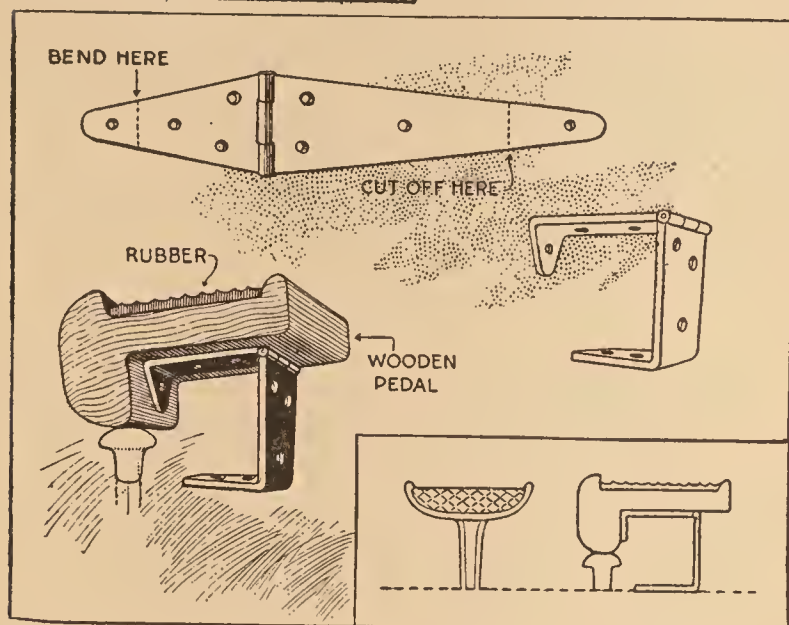
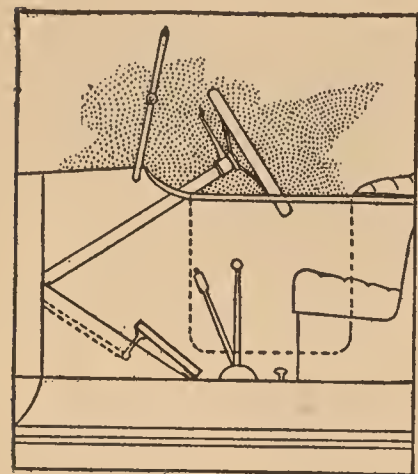


Rejuvenating Worn Carbon Paper

Waste of carbon paper can be largely overcome by applying a small typewriter brush such as used for cleaning the letters. The paper, as ordinarily used, receives all the wear in the center of the sheet, leaving a margin, on all sides, of good carbon. Lay the used paper on a smooth table, or piece of glass, carbon surface up, and hold the sheet firmly at one side; at the same time the carbon on the unused surface is distributed over the worn part with the brush.

A Simple Accelerator Pedal

Holding the foot on the accelerator pedal of an automobile for any length of time is more or less tiresome to the driver. The large drawing shows a neat-appearing pedal made from a common strap hinge, bent as indicated. A rubber-covered wooden block completes the ar-



An Arrangement for the Accelerator Pedal Which Eliminates Much of the Fatigue and Strain of Driving: A Strap Hinge and a Rubber-Covered Block are Used in Its Construction

angement. The small drawing illustrates a somewhat simpler arrangement, which consists merely of a hardwood block of the proper size, hinged to the floor board, and attached over the pedal as shown.

Portrait Photography in the Home

There is a wide field open to the amateur photographer who specializes in the making of portraits in homes. While the work requires some ingenuity, there is no reason why the average person should not be able to produce pictures of fair quality, which can be sold readily at moderate prices, after a certain amount of experience.

Tracing cloth is useful for directing light where it is needed. The cloth can be suspended from the ceiling, or fastened in collapsible wooden frames. Care should be taken not to supply too much top light, as this has a tendency to accentuate wrinkles in the face. Light is reflected on the subject from above and in front by stretching two widths of tracing cloth from the top of a window

casing to a point on the ceiling about 5 ft. from the wall, and then down, at an angle of 55°, to within 6 ft. of the floor.

For side reflectors, tracing cloth is hung over the backs of chairs, or on other pieces of furniture. The strength of side light is increased by placing the subject nearer a window, while the front and top lights become stronger when the subject is moved away from a window. Top light also can be regulated by adjusting window shades.

When a person with a round face is being photographed, a great deal of side light is necessary, and only a small amount of top and front light; for a thin face, the reverse is true. In any case, the subject's head should be turned so that not too much front light strikes the features, as this causes the face to appear flat in the finished picture. Light must fall on the eyes from only one side.

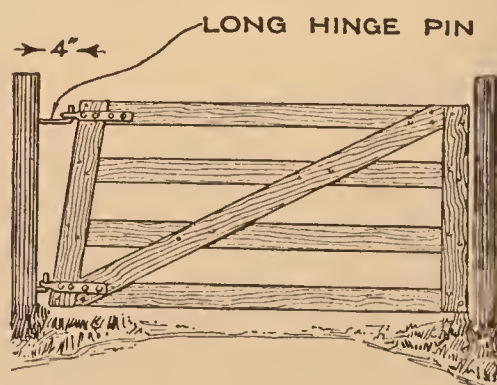
A mirror will serve as a side reflector, if held by an assistant or placed on a chair. In making portraits of children, mirrors are especially suitable.

Proper poses are difficult to obtain. The subject should be made to sit or stand in a natural position, with the head turned slightly to one side. Three-quarter-length portraits probably are the easiest to make, and are generally the most satisfactory. Excellent profile portraits are obtained by placing the subject opposite a window, with the face turned a little away from the source of light. The camera is stationed at the side of the window.

The walls of an ordinary room seldom provide a good background for a bust picture. A wide, light-colored window shade, fastened to a roller, which is mounted in a collapsible frame, provides a satisfactory background.—Charles Olive, Willmar, Minn.

A Self-Closing Gate

A farm gate that is self-closing is made like any similar gate except that the top



bar is 4 in. shorter than the bottom one; also, the upper hinge pin is longer than the lower by the same length. It will be seen that whenever the gate is swung open, the latch end will be elevated, so that it will swing shut of its

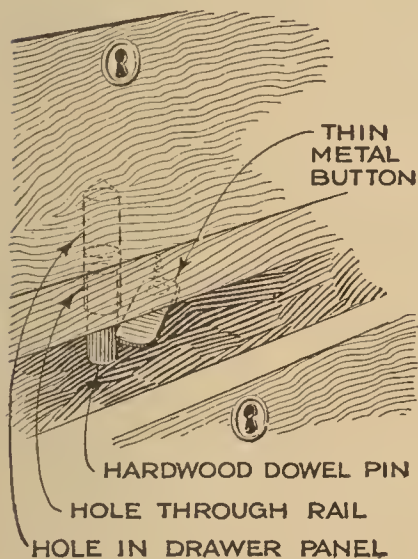
own weight, no matter how much or how little it is opened.—H. F. Grinstead, Columbia, Mo.

A Fly-Screen Clothes Hamper

For use underneath the laundry chute of a residence a fly-screen clothes hamper can be made. A light wooden frame is constructed so that the bottom is elevated several inches above the floor, and covered with screen wire. The original one simply consisted of several window screens fastened together. Such a hamper is large and roomy, and air is permitted to circulate through the soiled linen from all sides.

Drawer Locked by Secret Dowel Pin

The secret lock shown in the drawing was fitted to a drawer whose lock was rendered useless by the loss of the key. Simply drill a hole through the under rail and into the panel of the drawer. Into this hole a loosely fitting hardwood dowel pin, or a steel nail, is inserted. A thin metal button keeps the pin in position. To remove the pin and unlock the drawer, the clip is turned to one side which causes the pin to drop out. Not being easily discovered, such a lock may be applied, for additional safety, to drawers whose locks are easily "jimmied."

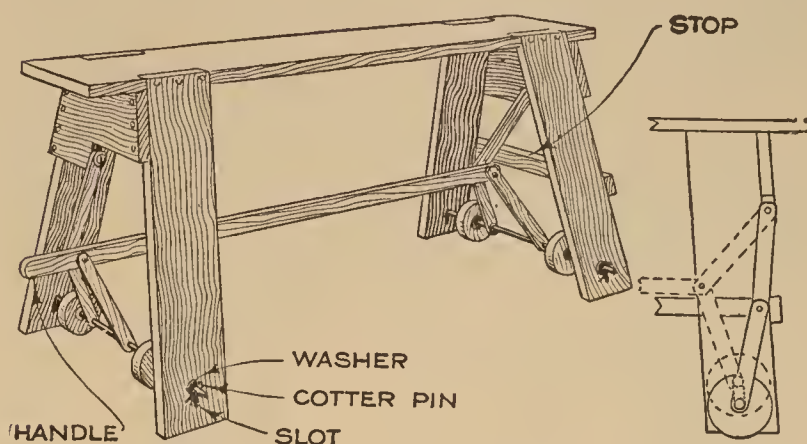


Transferring Carbon Copies

When making carbon copies in the typewriter, it frequently happens that the carbon paper is improperly inserted, and the duplicate is made on the back of the original copy. When this happens, a record duplicate can be made without rewriting the letter, although for the sake of appearance it would be better to do so. The blank sheet is laid on some flat surface and one side is rubbed with the end of a candle or piece of beeswax. The paper is then placed with its waxed surface upon the back of the original and rubbed with some smooth, hard object. A carbon copy of the subject matter will be obtained in this manner.—G. H. Holden, Chesterfield, England.

Sawhorse with Collapsible Casters

To save the labor required to carry a sawhorse from one location to another,

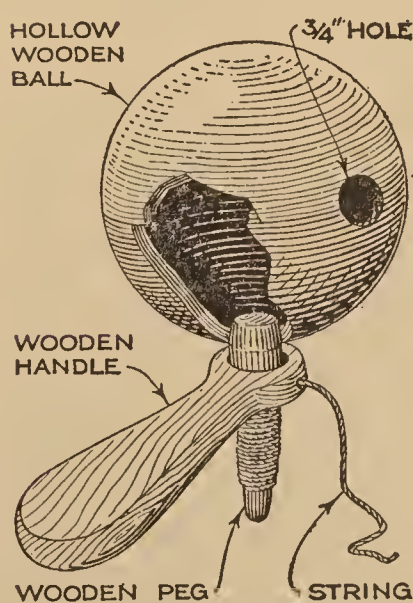


A Sawhorse Equipped with a Set of Casters, That are Brought to Bear against the Floor by Pressure on Toggle Levers, Makes Changes of Location Easy

a workman equipped it with a set of collapsible casters, as shown in the drawing. The caster axles are inserted through slots in the legs of the sawhorse, and washers and cotter pins are used on the projecting ends to prevent sideplay. A simple system of wooden toggle levers raises and lowers the casters from the floor. To lower the wheels, when it is desired to move the horse, the handle is pushed inward, and to remove them from contact with the floor the handle is given an outward pull.—Edward R. Smith, Walla Walla, Wash.

"Wild Indian" Top

A wooden top that will hop across the floor and howl like an Indian in full cry after a "paleface" scalp, can be easily

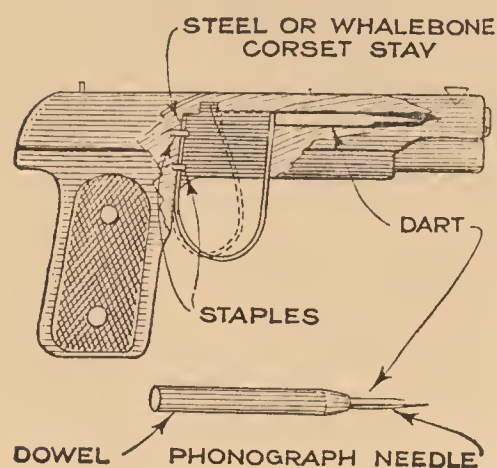


made by the amateur wood turner. The top consists of a hollow, two-piece wooden ball, which is turned from a piece of soft pine. A hole is drilled through the shell of the ball at one of the center marks and fitted with a hardwood peg having a slightly rounded end, as shown. At

right angles to the peg, a $\frac{3}{4}$ -in. hole is drilled. To spin this top, a wooden handle, such as the one shown, is required. The top string is wound around the peg, and the end is brought through the hole in the handle, as indicated. A quick jerk on the string sets the top in motion and pulls it free of the handle.

Pistol Shoots Phonograph-Needle Darts

It is generally recognized that "teaching the young idea how to shoot" is dangerous for the neighbors' pet cats, window glass, and other animate and in-

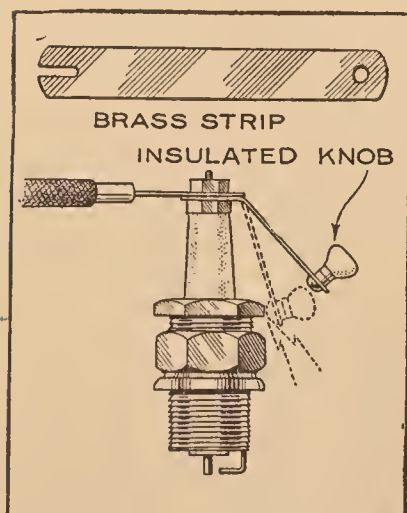


animate objects, but given a "gat" of the kind shown in the drawing, the youngster's ability to do harm is reduced to a minimum.

The gun is made from a piece of soft wood after the pattern of an automatic pistol, as shown in the drawing. The design is traced on the wood and cut out with a scrollsaw. The piece is then placed in a vise, muzzle up, and the barrel is drilled out with a $\frac{1}{4}$ -in. drill. An opening is cut in the underside of the gun with a chisel, to take the trigger; this is made from a piece of a steel, or whalebone, corset stay, about $4\frac{3}{8}$ in. long, which is fastened to the stock with staples in the manner indicated. The darts are made from a $1\frac{1}{2}$ -in. length of round dowel, small enough to slip into the barrel without sticking. A phonograph needle inserted into the end of the dart, as shown, will cause it to stick in the target.—Walter Thompson, Brooklyn, N. Y.

An Individual Spark-Plug Tester

A spark-plug tester that is applied to the separate plugs as shown in the drawing, eliminates the necessity of rooting around in the tool box for the screw-



When not in use the knob is held away from the plug, but when it is desired to make a test, the end of the brass strip is pressed against the plug to be tested.

driver, the instrument commonly used for the purpose. The tester is made from spring brass, as shown. One end is provided with a terminal for attachment underneath the binding nut on the plug, and on the other end is an insulated knob.

By short-circuiting the plugs, the missing one can be located and removed, and the tester placed on the new one.—Orene Cathcart, Winfield, Kan.

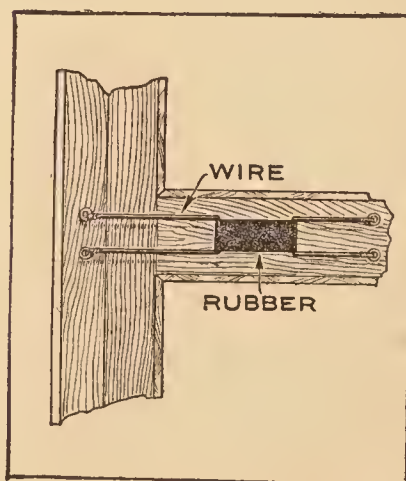
Drawer with Wire-Mesh Bottom Keeps Potato Bin Clean

A bin or drawer, in which potatoes are kept, has to be cleaned out periodically, to remove the accumulated dirt from the tubers. In order to keep his potato bin clean without the necessity of emptying it of the tubers or removing the bin from the built-in fixture, one home builder has arranged a very simple plan.

Below the bin that contains the potatoes is a shallow drawer, the potato bin itself having a bottom made from a piece of heavy wire mesh, held in place by a frame on the inside of the bin, at the bottom. As the potatoes are dumped into the bin the dirt drops through the wire into the shallow drawer underneath, which is easily emptied.—Chas. A. Goddard, Los Angeles, Calif.

A Substitute for a Door Spring

The drawing shows how an ordinary rubber band, plus some stiff wire and four screweyes,



can be made to take the place of a door spring, which is not always available. As indicated, two U-shaped pieces of stiff wire are linked together by the rubber band, the device being attached to the door by inserting the projecting hooked ends of the wires into small screweyes at properly spaced intervals.

The Camera as a Range Finder

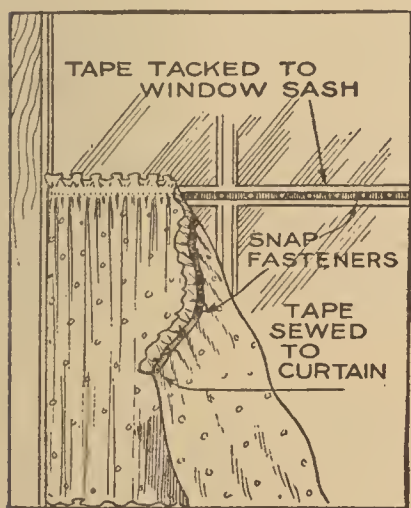
Few camera enthusiasts appreciate the fact that in a camera they possess a range finder of great simplicity, provided that the object photographed is more than 100 ft. from the lens, and that the object is of known length or height.

So long as the object photographed is more than 100 ft. distant, it is an experimental fact that the size of the object, O, is to its distance, X, from the camera, as the size of the image, I, is to its distance from a certain point in the lens combina-

tion, K ; that is, $O:X::I:K$. The latter quantity may be called the lens constant, and its value may be determined once and for all from a known value of X , greater than 100 ft., and for known values of O and I . For example, in one camera, a photograph taken of an object 100 ft. in length, and 300 ft. distant from the camera, shows an image length of 2 in. ($\frac{1}{6}$ ft.) in the photograph. Whence $100:300::\frac{1}{6}:K$. This indicates that for this camera the lens constant is $\frac{1}{2}$. Then the distance in feet of any object photographed may be obtained by dividing the actual size of the object by that of its image and multiplying the result by the constant $\frac{1}{2}$. That is, if one is photographing a mountain whose height is known, say 3,200 ft. above the floor of a valley, and the height of the mountain in the image is $2\frac{5}{16}$ in., or .192 ft., then the distance of the object is found by dividing 3,200 by .192 and multiplying the result by $\frac{1}{2}$, which yields 8,333 ft., the distance of the mountain from the camera.—L. Pyle, St. Louis, Mo.

Novel Method of Hanging Window Curtains

A method of hanging window curtains, which is at once novel and very satisfactory, is shown in the drawing.



A length of cotton tape, long enough to reach across the window, has small dress fasteners sewed to it every 3 in. This is fastened permanently to the window, either by tacking it to the top of the

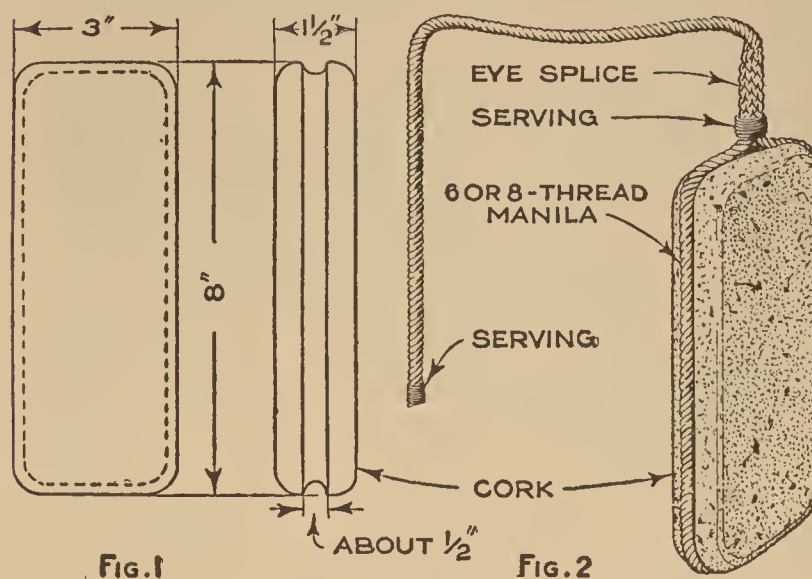
sash, or by stretching it from one side of the frame to the other. A similar length of tape, having the other halves of the fasteners fitted to it, is sewed to the curtain. The curtains can be quickly put in place by means of the fasteners, and as quickly removed for laundering.—T. W. Benson, Philadelphia, Pa.

Removing Splinters

To remove splinters from the hand, take an ordinary needle and press the eye over the part so that the projecting end of the sliver will stick through the eye of the needle. Then turn the needle so that the splinter will be caught in the eye, and withdraw it.

Fenders for Small Boats Made from Old Life Preservers

Very good fenders for small boats can be made from old life preservers. Remove



An Old Life Preserver will Make a Full Set of Fenders for an Ordinary Motorboat; Such Fenders Are Neat in Appearance and Low in Cost

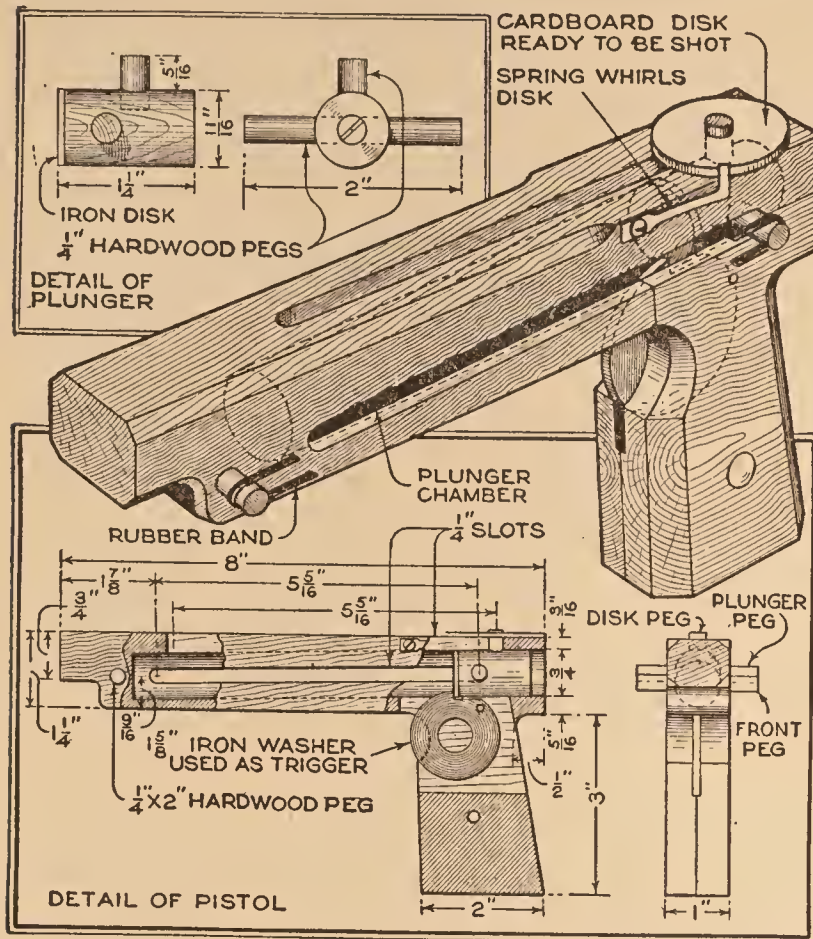
the old canvas from the blocks of cork, and with a fine-toothed saw, or sharp knife, smooth off the blocks on all sides so as to leave the finished block about $1\frac{1}{2}$ by 3 by 8 in. With a sharp gouge, about $\frac{1}{2}$ in. wide, cut a groove all around the block, as shown in Fig. 1, and round off the corners. A piece of 6 or 8-thread Manila rope, with an eye splice worked in one end large enough to pass around the block and fit in the groove, as in Fig. 2, is used for holding the blocks; a small serving of well-waxed sail twine, just below the splice, will hold the rope tight in the groove. The fender should be given at least two coats of paint or varnish, to correspond with the finish of the boat. An old life preserver will make a complete set of fenders for a small boat at insignificant expense.—J. A. Stevens, E. Boothbay, Me.

A Chemical Hot-Water Bottle

Sodium acetate and sodium hyposulphite are mixed together in the proportion of one part of the former to nine of the latter and placed in an earthenware receptacle with a tight-fitting cover, or stopper. The vessel is filled about three-quarters full of the chemicals, and the stopper, or cover, is applied; it is then placed in hot water until, on shaking, it is evident the salts have melted. It will be found that such a bottle will retain its warmth for about 12 hours. When the bottle begins to cool, its heat can be renewed by a vigorous shaking, enabling it to be used for a further period.

Pistol That Shoots Cardboard Disks

Any handy boy with a few tools can turn out the handsome toy pistol shown



Almost Anyone with a Few Tools can Turn Out This Handsome Toy Pistol; It Shoots Cardboard Disks and Is Entirely Safe and Harmless

in the drawing; this pistol uses cardboard disks for ammunition and is quite safe and harmless.

The wood parts should be made of well-seasoned hardwood, a block 1 by 5 by 10 in. being required. After dressing down all sides of the block smoothly, the outline of the gun is laid out; the block is placed in a vise, and the plunger chamber bored with a downward slant toward the muzzle, as shown. When the plunger chamber has been completed, the slots shown in the sides are cut out parallel with the center of the chamber; a similar slot is cut in the top of the gun. The slots completed, a hole is drilled through the block, in front of and directly in line with the center of the side slots, for the wooden peg which holds the rubber bands, as indicated. At this stage the gun is sawed from the block with a sharp fine-toothed saw. A compass saw and a sharp knife will be required to cut out the slot that accommodates the trigger, the latter simply consisting of an iron washer provided with a notch to engage the plunger and drilled with a bearing hole, as shown.

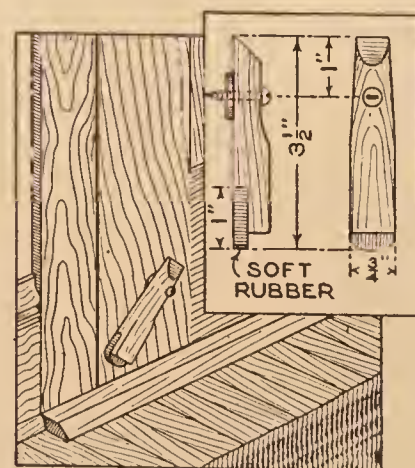
The plunger is made from a piece of round wood; it is first drilled for the pegs, as shown, then finished to make an easy fit inside the chamber, and a small

metal washer is attached to the front end to take the wear of the trigger. Three hardwood pegs, each about 2 in. long, are provided; one of these is glued into the hole provided at the front of the gun, and the others are glued into the plunger after it has been placed in its chamber. The vertical plunger peg will be found much longer than necessary and should be cut off flush with the top of the gun when the plunger is at rest at the forward end of the chamber. When pulled back toward the trigger, this peg will project above the surface sufficiently to allow a cardboard disk to be placed over it. The small flat spring, shown attached at one side, presses lightly against the disk and gives it a whirling motion. As shown, the trigger is held in place by a small screw or nail, and some little patience will probably be required to get it into the proper position to engage with the plunger. For the sake of appearance, a small cap of wood is glued over the open end of the plunger chamber, and the gun is ready to be finished as desired. Rubber bands are attached to the pegs of the plunger and the one at the front of the gun, as shown in the drawing, and, as the power of the toy is determined by the bands used, the tension should be, as nearly as possible, the same on both sides.

When cocking the gun, slant the barrel downward so the trigger will swing into position of its own weight. The cardboard disks used for ammunition should be slightly more than 1 in. in diameter, with a hole at the center to fit over the vertical peg of the plunger.—A. L. Long, Springfield, Ill.

An Efficient Doorstop

The drawing shows an efficient device for holding a door open that is easily



made from a piece of an old broom handle. This is cut and shaped to the appearance indicated, and a recess is formed on the inner edge of the wood, in which a piece of soft rubber is inserted, as shown.

The stop is attached to the bottom of the door by a single screw, with a washer between it and the door, to prevent disfiguring the finish of the latter. A slight pressure of the foot is sufficient to operate the stop.

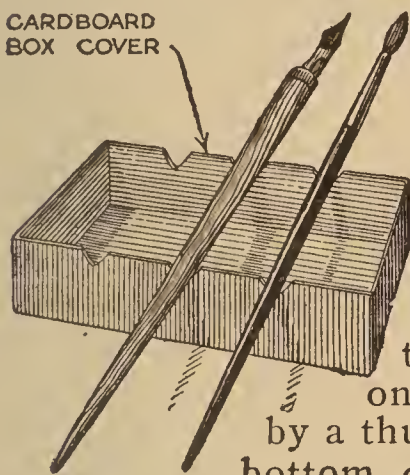
Electric Iron Aids in Starting Auto

An ordinary electric flatiron can be used as an aid in cold-weather starting, by setting it on a suitable support, such as a tin can, on the carburetor side of the engine, with the hood closed and the radiator covered. If the garage-lighting system is connected to the house, it is only necessary to turn on the current an hour or so before the car is to be used, and the carburetor and surrounding parts will be sufficiently warmed up to enable the engine to be started without difficulty.

Penholder for Slanting Surfaces

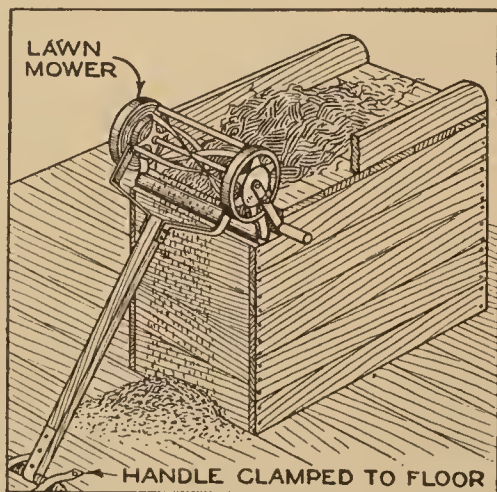
A convenient holder for pens and brushes when used on a slanting surface, such as a drawing board, is made by cutting V-shaped grooves in the opposite sides of a small pasteboard box, as shown in the drawing. The holder may be attached at any place on the board, or table, by a thumbtack through the bottom of the box. By the use of such an arrangement, the most commonly used pens and brushes may be kept conveniently accessible and without danger of their rolling over the surface of a drawing. The box itself can be used for holding such small articles as thumbtacks, pens, etc., or as an ash tray.

CARDBOARD BOX COVER



Lawn Mower for Cutting Feed

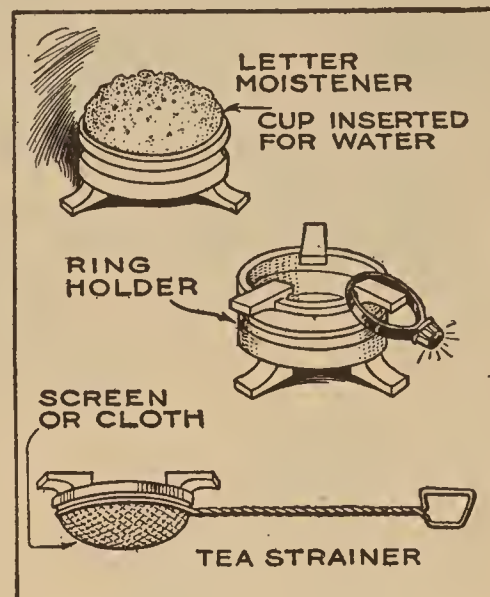
The lawn mower may be used to advantage for chopping clover or straw for the chickens. It is attached to a box by two small iron screw clamps, in the position shown in the illustration. The cutter blade should rest flush with the top of the box, and it may be necessary to sink it in, to feed the loose hay properly to the mower. The crank is attached to one of the drivewheels by means of $\frac{1}{4}$ -in. bolts. The handle is fastened to the floor.



Utilizing Old Gas-Mantle Bases

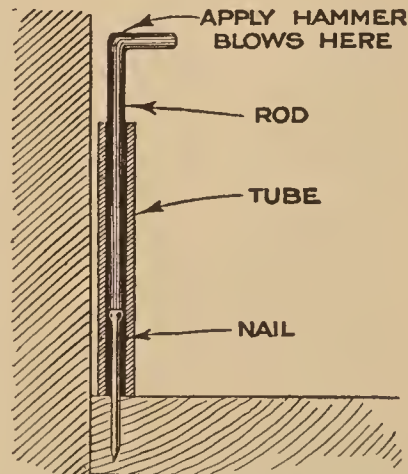
The present-day tendency of reclaiming all forms of scrap may be applied in the home, just as well as in the workshop, and, as the illustration shows, even such unlikely material as gas-mantle bases may be made into something useful, as well as ornamental.

No description of these devices is necessary; suffice it merely to say that the objects illustrate only a few of the many uses to which these hitherto despised articles may be applied.



Nail Driver Assists the Amateur

A handy little addition to the amateur's equipment is made from a piece of thin metal tubing and a piece of iron rod, as shown in the drawing, for driving nails in tight corners. The rod is filed flat on the bottom, and is heated and bent at the top to form a handle. To use this device the tube is set over the place where the nail is to be driven, and the nail is dropped into it, point down; the rod is inserted, and the hammer blows are applied to the top of the rod instead of the nail. This little tool will be found particularly valuable when working close against finished surfaces.

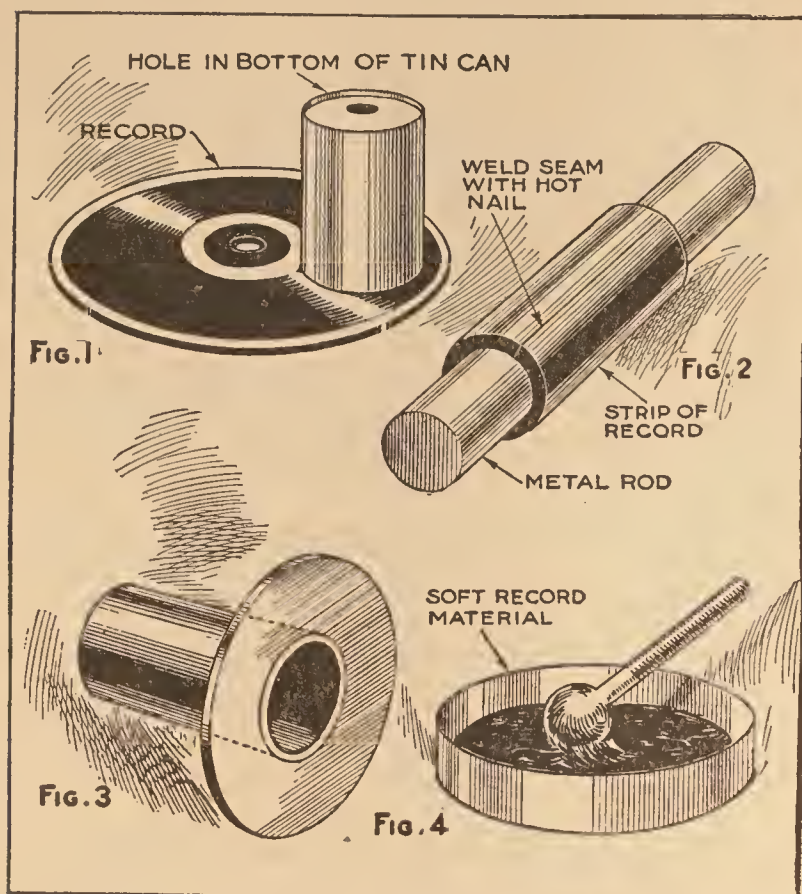


Corset-Steel Handle for Handbag

An old corset steel makes a good handle for a woman's handbag. The steel rib is covered with a suitable gimp, and the ends are sewed inside the mouth of the bag. The tendency of the steel, which is bent into an arc, to straighten itself, keeps the mouth of the bag taut, and there is no need of using a stay of any kind.—Amelia P. McDonald, Woods Cross, Utah.

How to Work Old Phonograph Records into Useful Articles

Old phonograph records provide a cheap and satisfactory insulating material



By Applying Heat and Working the Material While Hot, Old Phonograph Records Provide a Cheap and Satisfactory Insulating Material for the Amateur Electrician

that is readily formed into almost any shape by the application of heat. Disks are cut by pressing a tin can, or piece of tubing, that has been heated almost red-hot, against the record, as shown in Fig. 1. If a tin can is used, a hole is cut in the bottom so that the disk can be pushed out before it has a chance to "freeze" to the inside of the can. As shown in Fig. 2, a tube, or bushing, can be made by heating a strip of the record and forming it around a rod, or tube, of the desired diameter. If the strip is too long, the surplus is cut off with scissors, while warm; it cuts clean and sharp. Bring the edges close together and pass a hot nail, or other piece of heated metal, over the joint to weld the seam. Figure 3 shows a flanged bushing, the joint being welded as described. A little practice is required to make these joints, but the work is easily done. A very neat head can be made for a screw by melting some pieces of old record in the cover of a can. Do not try to heat it too much; when the material is soft enough to gather on the head of the screw, it is sufficiently warm. Roll the screw around until a lump of sufficient size has been collected, as in Fig. 4, and form it with the fingers, pressing it tightly around the screw head, to make a good

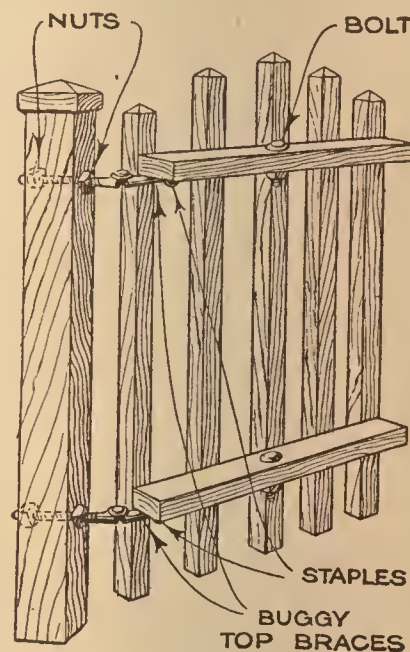
connection. While still soft, the head may be pressed into a mold, which may be simply a smoothly bored hole in a piece of wood, or the material may be allowed to cool and afterward finished with sandpaper.—Howard Greene, New York, N. Y.

Cleaning Out Stovepipes

One of the quickest and most effective methods of cleaning the interior of stovepipes after they have been taken down for the summer, or when the stove refuses to draw, consists in drawing a small bush or bough through the separate sections. The bush, or branch of a tree, whichever is used, should have as many small twigs as possible. After it has been inserted into one end of the pipe the improvised brush is pulled through from the opposite end.—George G. McVicker, North Bend, Neb.

Hinges from Buggy-Top Braces

Just as the packers utilize everything but the grunt of the pig, the mechanically inclined farmer finds some practical application for every usable bit of metal, as witness the substantial pair of gate hinges made from the braces of an old buggy top. The braces are cut to the length desired and attached to the underside of the gate stringers. The ends of the braces, which fit into holes drilled through the gatepost, should be heated, rounded off, and provided with threads for a nut on each side of the post.—C. A. Black, Jr., Hightstown, N. J.



Sprayer for House Plants

As house plants are likely to be injured by pouring a solid stream of water over them, it is best to use some form of sprinkler and apply the water in a fine spray. A suitable sprinkler is made by cutting a series of V-shaped notches around a cork and inserting it into a bottle that has been filled with water. The bottle can also be used for sprinkling clothes in preparation for ironing.



Making Molded High-Tension Condensers

By F. L. BRITTIN

MOLDED condensers have always been held in high favor by radio amateurs. Owing to its portability and absence of brush discharge, a well-made molded condenser will stand a considerable overload without break-down, and is not messy or greasy like the oil-immersed variety, which is often used, owing to the high price of the molded article. By carefully following the directions given in this article, the amateur can make for himself, at a fraction of the cost of the manufactured one, a molded condenser that will equal the results of the factory product.

Ten 8 by 10-in. photograph plates can be obtained from any photographer, at little or no expense, from his pile of discarded negatives; these plates are glass of good quality and make a good dielectric. The gelatin emulsion on the negatives can be soaked off with hot water, and the glass thoroughly cleaned and dried.

Cut nine sheets of thin sheet copper, or if this is unobtainable, florists' foil, into pieces 6 by 10 in., allowing 2 in. at the upper end for the formation of the terminals, as shown in Fig. 1; or these terminals may be small strips of sheet copper, or brass, drilled with a small hole for connecting to the heavy copper strips. The cabinet can be made of any wood at hand, and is 3 by 10 by 11 in., inside measurement, coated inside and out with black asphaltum insulating paint; the top end should be made from fiber or bakelite, with small slots in each end, as in Fig. 3,

to accommodate the terminals. The cabinet is joined together and laid flat, leaving the top cover off and with an extra piece of glass in the bottom, cut to fit exactly inside the cabinet. Then, make

up the condenser unit, as shown in Fig. 4. The nine sheets of foil or copper, cut as in Fig. 1, are placed alternating with the glass plates, every other sheet of foil being reversed so that the leads, or tabs, are on opposite sides. The metallic sheets should be placed exactly in the center of the glass plates, so that there will be a 1-in. margin of glass on all sides, as in Fig. 1. If using thin foil, put small cardboard strips between the plates, at top and bottom, to allow for a free cir-

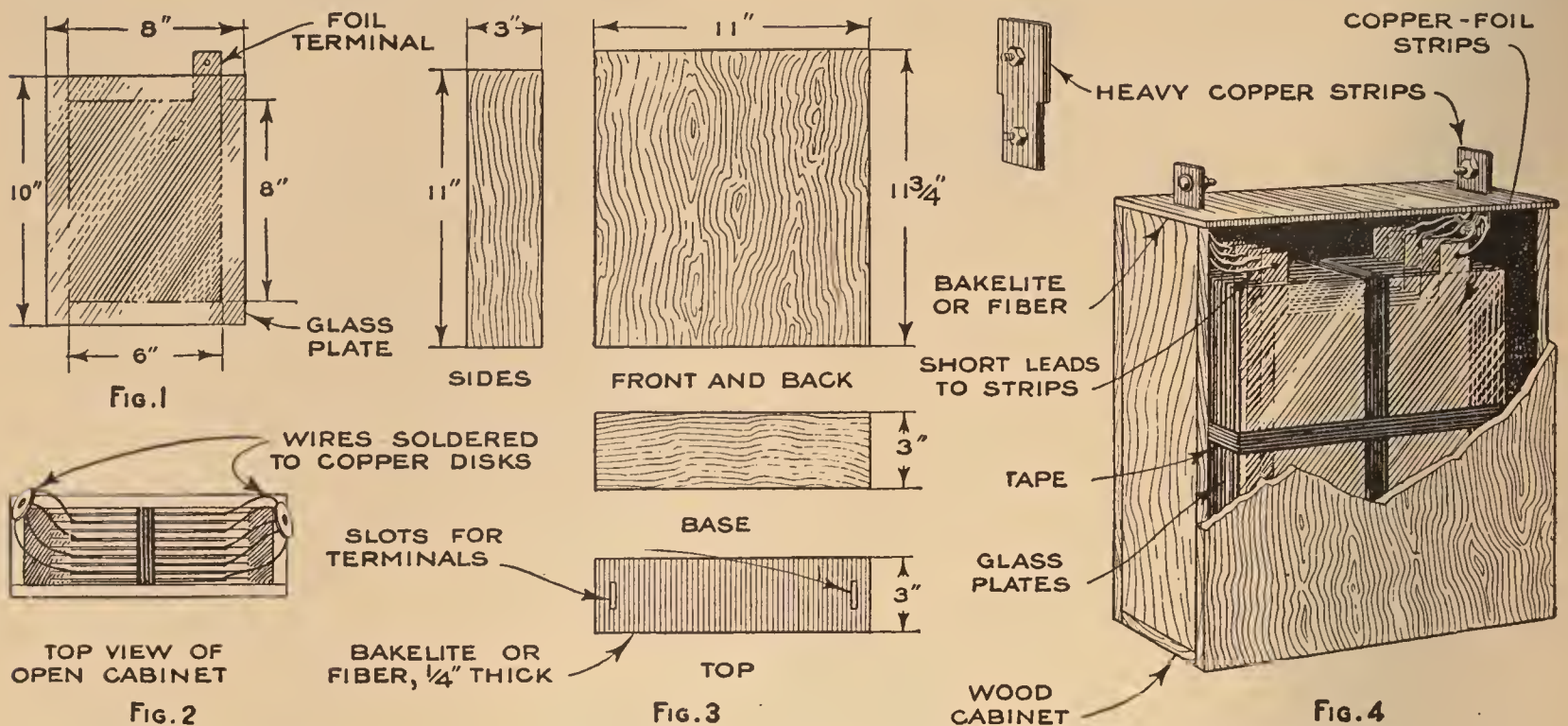


Molded Condensers are So Easily Made That Their Use should Be Universal among Amateurs

culating wax. Tape the unit together, as shown in Fig. 4, and place it inside the cabinet. Connect the leads to the terminals, using either the heavy copper strips shown in Fig. 4, or large binding posts. After all connections have been well soldered, the instrument is ready for the insulating compound, which is a wax obtainable from any electrical-supply house; its melting point is around 212° F., and it is the kind generally used in transformers. The wax is melted and made ready to pour on. See that the cabinet is free from all moisture, and that the unit is in its proper position in the cabinet, with a 1-in. space around the edges on the sides, and a 1/2-in. space at the bottom. Pour in the insulating wax and completely cover the condenser unit to within 1/8 in. of the

top; when cold and hard, place an extra piece of glass over the wax to completely

for use with a $\frac{1}{2}$ -kw. transformer and, if more condenser capacity is needed for



Discarded Photographic Negatives, Thin Sheet Copper, or Tin Foil, Together with Other Easily Obtained Materials, are Transformed into the Condensers Necessary for the Radio Experimenter

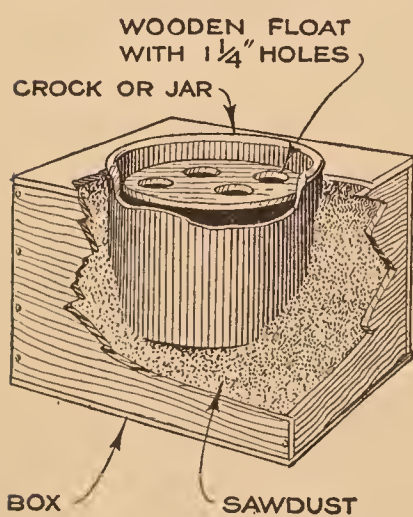
cover it, and screw on the front of the cabinet.

Such a condenser is a very good size

higher potentials, two or more such condenser units can be made and connected in parallel-series.

Nonfreezing Poultry Fountain

A drinking fountain for poultry that keeps the water cool in summer and prevents freezing in winter, and also prevents pollution of the water, is shown in the drawing.



A glass, or earthenware crock or jar is set into a wooden box, into the bottom of which several inches of sawdust have been placed; the space between the sides of the box and the vessel is similarly filled with sawdust. A wooden float, having a series of 1-in. holes drilled in it, is waterproofed with shellac and placed inside the water vessel, as shown.

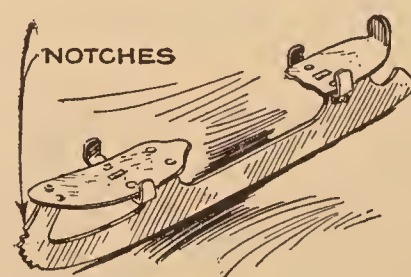
Table Mats Made of Braided Rags

Braided rag rugs are rather common and the same method can be applied in making table mats for hot dishes. Tear the rags into narrow strips and as long as possible. Then take three strips and braid them together exactly as hair is

braided. The strips are braided into a continuous strip several yards long, the ends of separate strips being sewed together. Starting at the center, the edges of the braided strip are sewed together to form a circle or oval; strong thread should be used, and the braid should be sewed so that the completed mat will lie perfectly flat. Such mats may be made of any color, or combination of colors, but one of the simplest, and consequently most effective, ideas is to make the body of the mat from white rags with an outside band of some color that harmonizes with the china, or other table decorations. —Mrs. Jessie S. Hawthorne, Maywood, Illinois.

Notches on Skates an Aid to the Skater

A skater has found that by notching the point of his skates, as indicated in the drawing, he is able to make a quicker start. Several



notches are made in each skate, about $\frac{1}{2}$ in. above the edge of the runner, which make it a very simple matter for the skater to control his maneuvers. —Dale R. Van Horn, Lincoln, Neb.

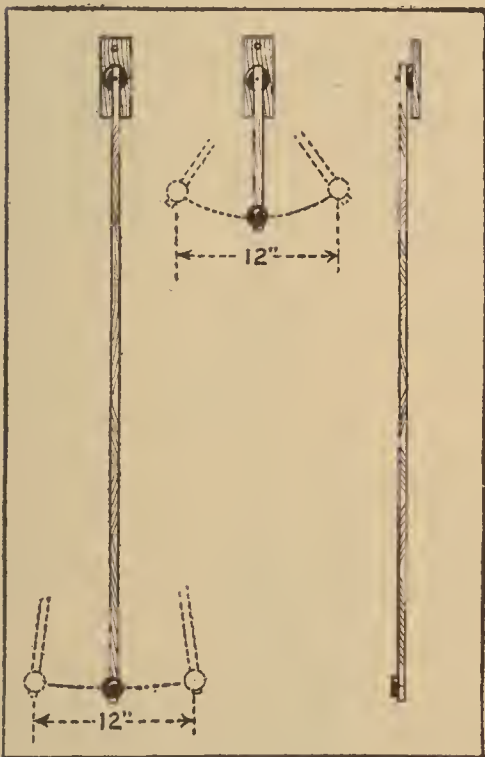
"Davy Jones' Locker" Window Display

A representation of what "Davy Jones' locker" is supposed to look like can be produced in a show window for display purposes.

A glass aquarium has about an inch of sand spread over the bottom, and a toy tin boat, about 1 ft. long, is arranged on the bottom, to present the appearance of having been sunk; then the tank is filled with a solution composed of 9 parts water and 1 of water glass, or sodium silicate. About $\frac{1}{4}$ lb. each of copper sulphate, ferrous sulphate, nickel sulphate, and cobalt nitrate are mixed and scattered into the tank. Immediately there will begin a beautiful crystalline growth that gives the appearance of a sunken boat lying in a marine garden of plants of different shapes and colors.

Simple Timing Pendulums

The speed at which a hand-operated cream separator is run is an important factor in its efficiency. In most separators, the crank should make 60 turns a minute, but, as the operator usually times

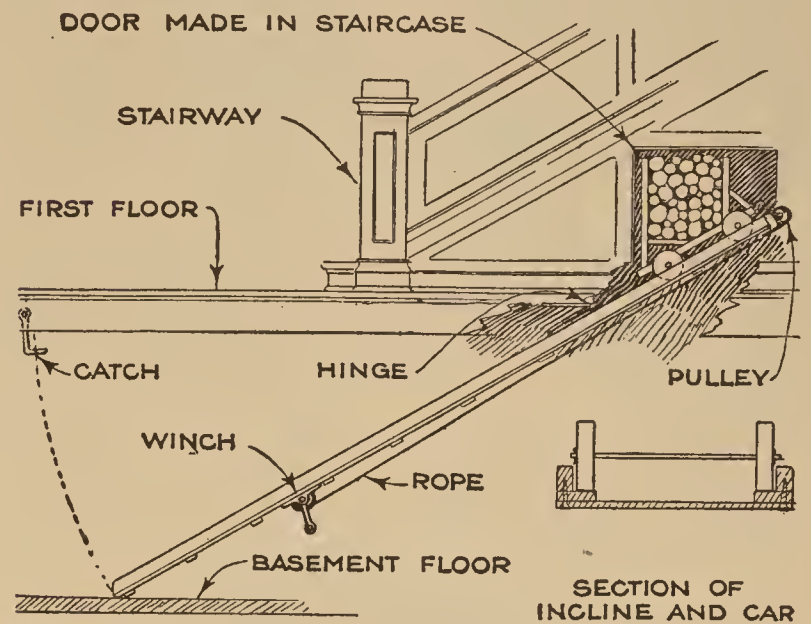


the speed by guesswork, modified by his mood, there can be no assurance that the correct speed is being used. For counting the number of revolutions per minute a simple pendulum will be found sufficiently accurate for practical purposes and will eliminate the uncertainty. The pendulum is made by attaching a 2-oz. weight to one end of a thin strip of wood, 48 in. long. Forty-six inches from the center of the weight bore a hole large enough to permit the pendulum to swing freely on a nail, as in the drawing. Start the pendulum with a swing of about 12 in., and it will swing from side to side 60 times per minute. With the same weight, but with the hole 10 in. from the center of the weight and the pendulum started with a 12-in. swing, the rate will be 120 per minute.

the speed by guesswork, modified by his mood, there can be no assurance that the correct speed is being used. For counting the number of revolutions per minute a simple pendulum will be found sufficiently accurate for practical purposes and will eliminate the un-

An Inclined-Track Wood Lift

Carrying wood from the basement to the fireplace on the first floor, besides

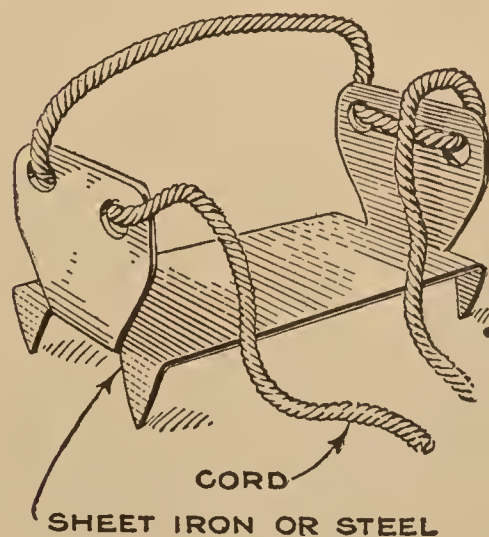


An Inclined Railway underneath the Staircase Provides an Easy Means of Bringing Firewood to the Upper Floor

being hard work, usually results in more or less dirt being scattered over the house. The drawing shows an arrangement by which the firewood is loaded onto a truck in the basement and hauled up an incline underneath the stairway. When the car is loaded at the wood pile, it is pushed to the incline and hooked to a rope. Winding up the rope on the winch elevates the car to the upper floor, and, should it be desired, the inclined track can be raised out of the way and held against the basement ceiling with a spring catch. Opening a paneled door in the staircase gives access to the fuel.—Edward R. Smith, Walla Walla, Wash.

Homemade Ice Creepers

A pair of creepers that will prevent slipping and sliding of the wearer on ice-coated walks, and add to his comfort and

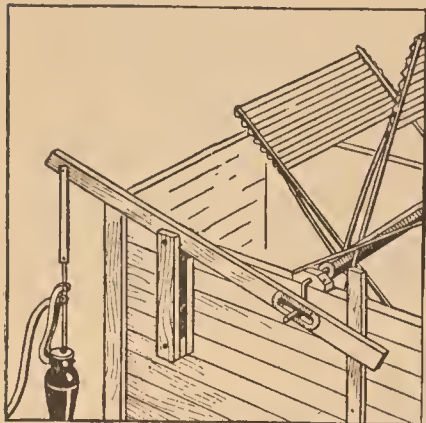


safety, can be easily made from two pieces of No. 18 gauge sheet iron or steel, preferably the latter. The pieces are laid out and formed as shown in the drawing. The finished creepers are to be

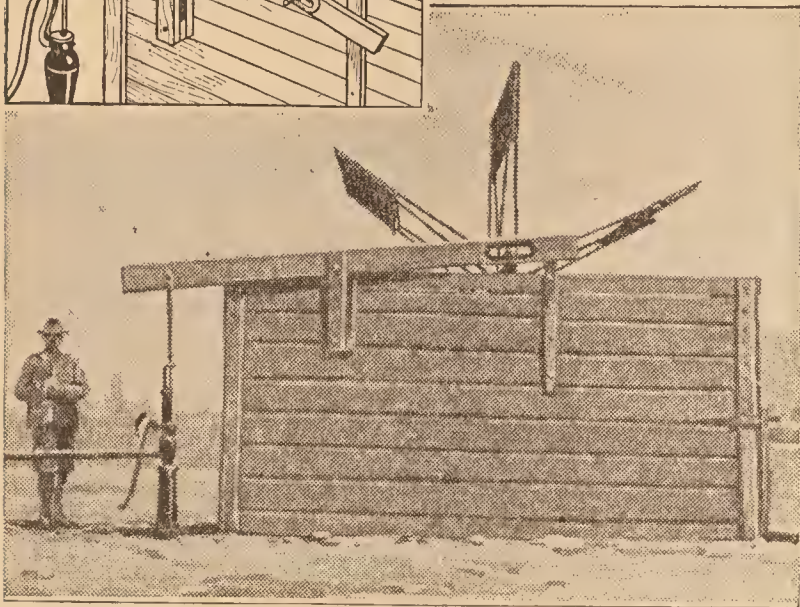
worn underneath the insteps, a suitable fastening being provided on each, to hold it securely in place.

A Cheap and Serviceable Windmill

In localities where the prevailing wind blows from one direction, the windmill



indicated in the engraving can be built for a fraction of the cost of a mill of the conventional type. As shown in the photograph, the

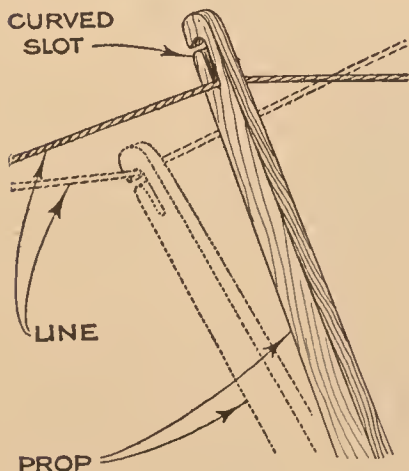


Where the Prevailing Winds Blow from the Same Direction for Most of the Year, This Simple Windmill can be Built and Operated at Practically No Expense

vanes are made of corrugated iron held in flat-iron frames which are bolted to the hexagonal axle, made by shaving down a log. The power of the windmill is conveyed to the pump, as illustrated in the detail drawing, by means of a crank in the end of the axle, which operates the wooden beam connected to it and the top of the pump rod.—Leland Perry, Cedar City, Utah.

Improved Clothesline Prop

On washday, when the wash has been hung on the line to dry, it often occurs



that the clothes prop will slip from the line, particularly when the weather is windy. No matter how carefully the loaded clothesline is propped up, the swaying of the line will allow it to slip out of the usual V-notch in

the end of the pole, and the freshly washed clothes are allowed to dangle on the ground. The prop shown in the drawing, unlike the usual style, will not slip

from the line in the windiest weather. A curved slot, which is slightly wider than the diameter of the line and about 4 in. long, is sawed into the end of the pole, as shown; the curved end of the slot prevents the line from becoming disengaged.—Chas. Homewood, Ontario, Calif.

Using the Bathtub as a Print Drier

A piece of cheesecloth, about 3 ft. long and from 6 to 8 in. wider than the bathtub, eliminates the necessity of stretching the cheesecloth over frames for drying prints in the amateur's dark room, which is generally the bathroom. The cheesecloth is secured underneath the roll rim of the tub with spring clothespins, and makes a satisfactory surface for drying the prints, which are placed, face down, on it and allowed to remain until dry.—Clayton H. Smart, Hartford, Conn.

Refinishing the Bicycle

The winter is a good time to renovate the bicycle, as most owners use their machines but little during that season. The frame and rims should first be sandpapered, then the enamel to be used is thinned with a little turpentine, and a thin coat applied to the frame. When this coat has dried hard, it is rubbed down smooth with fine sandpaper. Wipe off all dust, and apply a second coat of enamel, using a camel's-hair brush.

To line the frame and give the job a finished appearance, it is not necessary to have the skill required for handling a stripping brush, as a double-jointed compass with a pen point



may be used. Dust with French chalk the work already enameled, and fill the pen with any color of waterproof India ink, obtainable at almost any stationery or art-goods store. Draw the lines lightly and evenly, keeping the compass point against the frame, as shown in the drawing. When the ink has dried, dust off the chalk, and apply a coat of the best carriage varnish.—Leslie S. Gillett, New York, N. Y.

Toy Balloons for Scarecrows

Fruit growers lose thousands of dollars yearly through the depredations of fruit-eating birds. In orange groves, sparrows and linnets peck out every vestige of orange flesh, and the empty orange "shell" dries on the stem. Figs and other soft fruits are worthless when even slightly damaged.

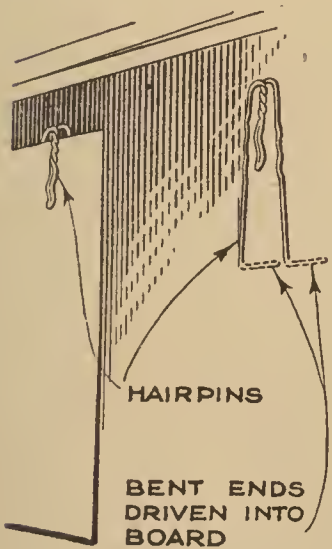
Numerous devices to scare away the feathered thieves, such as bells, clappers, and the like, have been more or less ineffective. It has been found that if hydrogen-filled toy balloons are anchored in the grove, their swaying in the breeze will keep the birds away, although they have no fear of scarecrows and noise-making devices.

Potted Plant as Flower Holder

To make a little potted plant seem like a bowl of cut flowers, plant four or five ordinary glass test tubes in the earth around the roots of the plant; they are placed in a leaning position, partly for ease in arranging the cut flowers, and partly to make it possible to change the water without completely inverting the pot. The tubes are buried in the earth so that only about $\frac{1}{2}$ in. of the tops protrude above the surface. As occasion may require, the test tubes are filled with water for the stems of the cut flowers, which are placed in them. If the plant is a flowering one, the cut flowers should, of course, be selected so as to preserve a harmonious color scheme.

A Hairpin Clip for Bulletin Boards

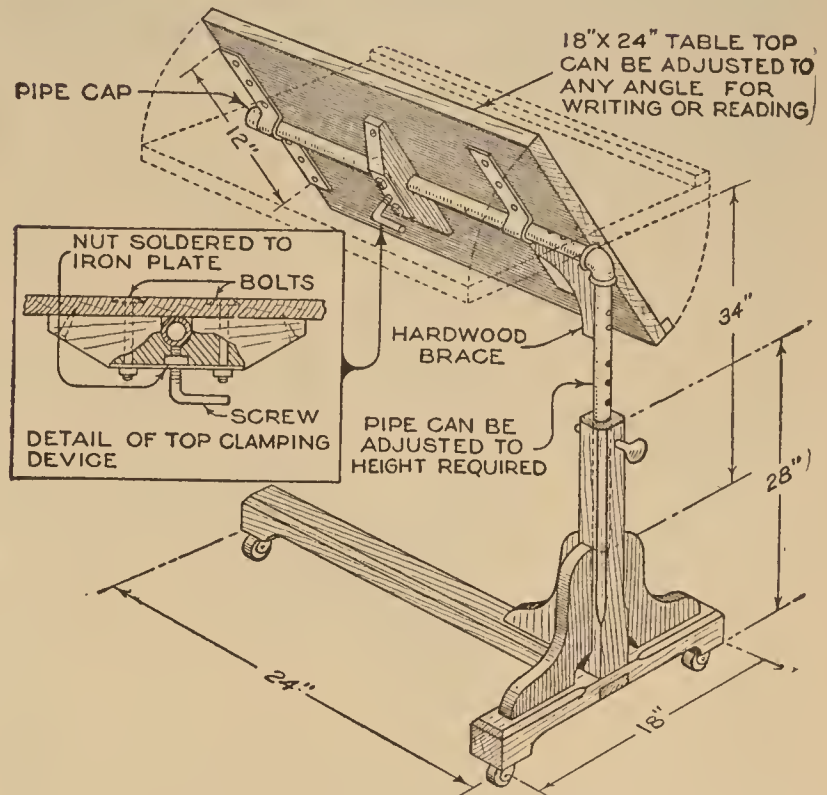
A bulletin board, on which notices such as telephone calls, or other memoranda can be posted, and which may be made at small cost is shown in the drawing. A bulletin board of the conventional type and size is made from some soft wood and painted black. The board is provided with the requisite number of clips made from hairpins of the hump-back type. The ends of these are bent at right angles with a pair of pliers. The bent ends are



driven into the wood with the remainder of the hairpin extending parallel with the board, as shown in the drawing.

Invalids' Bedside Table

An easily made invalids' table, such as the one shown in the drawing, will be



For a Convalescent, or for Bedridden Persons, This Bedside Table will Prove to Be a Decided Convenience

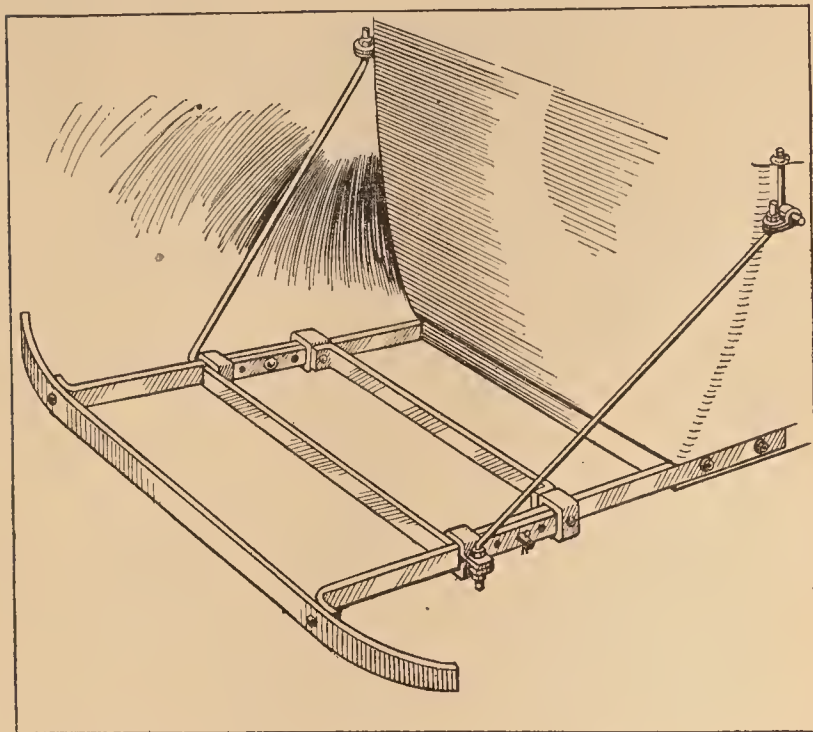
found a great convenience to the bedridden unfortunate, as he may read, play cards, and eat his food without having to juggle a tray on his body, with the ever attendant danger of spilling the contents on the bedclothing and creating an unpleasant situation.

Such a table may be made almost entirely of wood, pipe and fittings being used to support the table; the underside of the angle formed by the junction of the pipes is reinforced by a hardwood brace attached with rivets. The table top is held to the pipe with iron straps, as shown, and is clamped in any position by a turn of a screw. This clamping arrangement is merely a nut soldered to an iron plate and fitted with a screw. This is bolted to the underside of the table, in the manner shown in the drawing, so that a turn of the screw applies or releases pressure on the pipe and permits the table top to be adjusted. Holes are drilled through the vertical pipe and the standard into which it slides, and a peg is provided for adjusting the height of the table as desired. Easy-running casters are provided for the wooden standard, which is run underneath the bed, so that the patient can easily push the table out of the way.—Harry B. Mowery, Charleston, S. C.

ⓘ Rusted bolts, etc., can be loosened by soaking in ordinary vinegar for a few hours.

Combination Bumper and Luggage Carrier

A combined luggage carrier and rear bumper, which makes a desirable addition

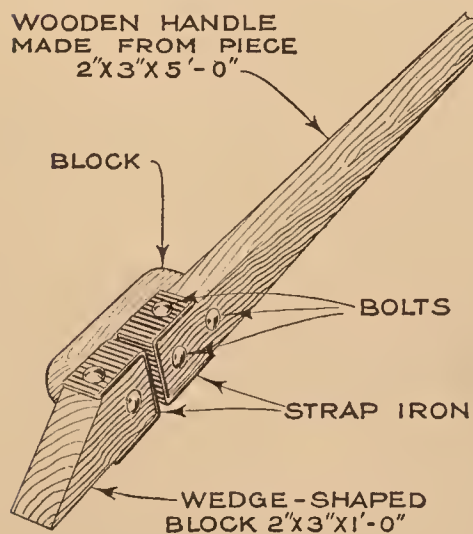


A Combined Rear Bumper and Luggage Carrier That does Not Detract from the Appearance of the Car Is of Special Convenience When Touring

tion to the automobile, is shown in the drawing. As indicated, the entire assembly is made of flat steel stock, and is arranged so that the bumper is easily adjusted by loosening a few pins. The parts are riveted together, and the luggage carrier is bolted to the chassis side rails, without drilling, by using U-bolts. Steel braces from the top brackets to the luggage carrier are used, as indicated, to strengthen the carrier. This attachment is particularly designed for cars with either cantilever or transverse rear springs.—G. A. Luers, Washington, D. C.

A Simple Wire Stretcher

For tightening the individual strands of a plain wire fence, the stretcher shown in the drawing is one of the simplest and most effective devised. The iron-shod wooden handle and wedge-shaped block are attached to a block with bolts, as indicated, so that they will be about $\frac{1}{4}$ in. apart. In use, the end of the wire is inserted in the opening between the handle



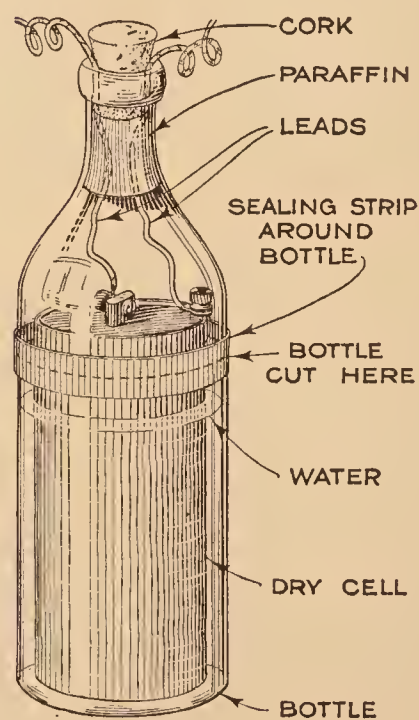
and the wedge-shaped block, which is placed against the fence post. As soon as the stretcher is put in place, force is applied to the handle, and the wire is squeezed between the iron faces of the parts; continued pressure against the handle draws the wire to the desired degree of tension.—Chas. A. Black, Jr., Hightstown, N. J.

Preserving Croquet Balls and Mallets

To help preserve croquet balls and mallets, take an old felt hat and cut from it circular pieces slightly larger than the face of the mallets; these felt disks are attached to the ends of the mallets with glue and small brads. It will be found that while the felt-covered mallets are as effective in the play, they save the wood and minimize the noise produced when the balls are hit.—Mrs. Virginia B. Musgrove, Pasadena, Calif.

Prolonging Life of Dry Cells

When dry cells are used for doorbells and other intermittent service, they usually dry out before their full energy has been utilized; this is prevented by furnishing moisture, as shown in the drawing. Large glass bottles are cut at the point indicated, either by pouring oil into the



bottle to the correct height and plunging a hot poker into it, or by wrapping a string, soaked with alcohol, around the bottle, and igniting it; when the alcohol has burned out, the bottle is plunged into cold water. The lead wires are inserted through the neck of the bottle and separated by a cork, as shown, enough wire being left below for connecting to the cell. The cardboard carton is removed from the cell and several holes are punched through the bottom of the zinc container. The lower half of the bottle is partly filled with water, the battery is connected to the wires and placed inside the bottle which is secured together, at the cut, with a strip of tape or gummed paper.—Thos. W. Benson, Philadelphia, Pa.

MOTOR-DRIVEN SLEDS

By Roy B. Brown

FOR those who wish to build a motor-driven sled, but do not want to go to the trouble and expense of making or buying an aerial propeller, and adapting the engine to this form of drive, the illustrations of wheel-driven sleds in this article will be of value.

The machine which is shown in the first photograph has a light steel frame supported on oak runners, shod with round steel. The sled is driven by a four-cylinder motorcycle engine, geared to the driving wheel in the same manner as in the motorcycle. The driving wheel, which is a standard motorcycle wheel, is mounted in a U-shaped angle-iron yoke, the ends of which are attached to a crosspiece on the steel frame by means of stout hinges. A stiff spring is provided on each side of the yoke for holding the wheel to the surface, while at the same time permitting free vertical movement, thus there is no loss of traction and the

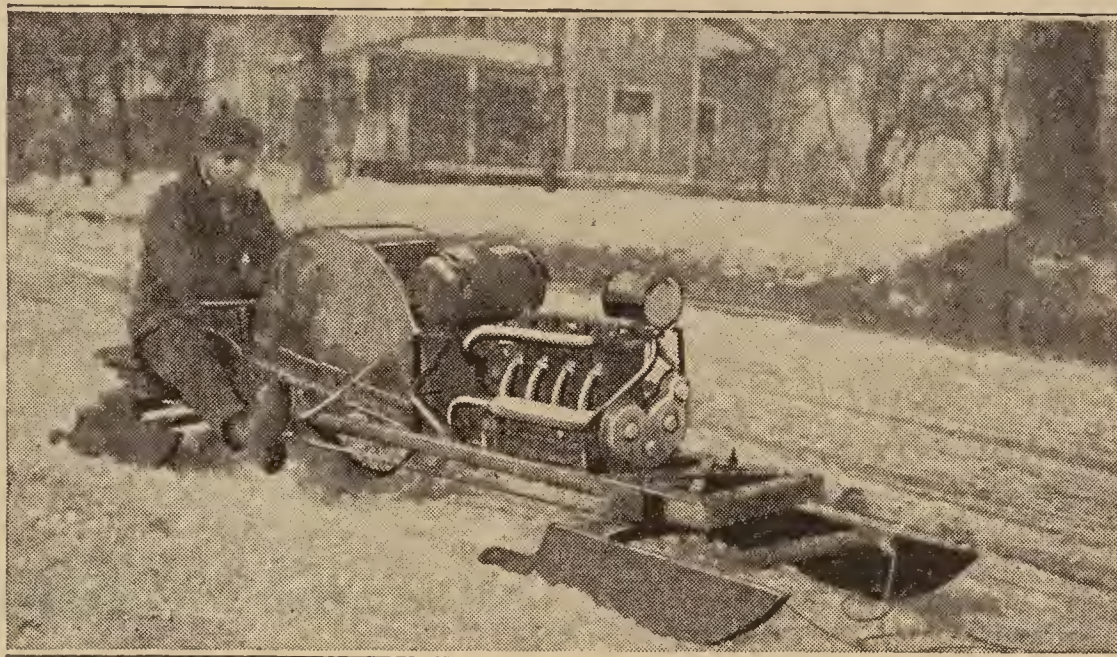
sled is enabled to travel over uneven ground. The wheel is covered by a sheet-

steel hood, forward of which, a little above the top of the engine, the gasoline tank is mounted on a frame made of flat iron. The sled is steered by means of the front runners, which are controlled through sash-cord

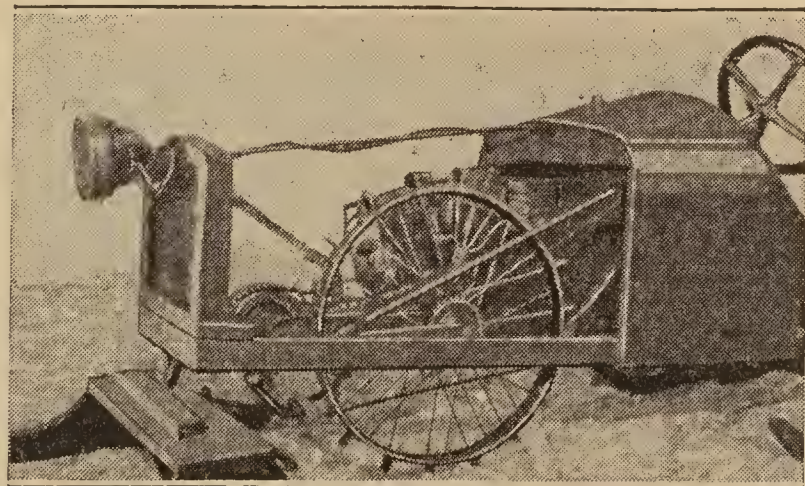
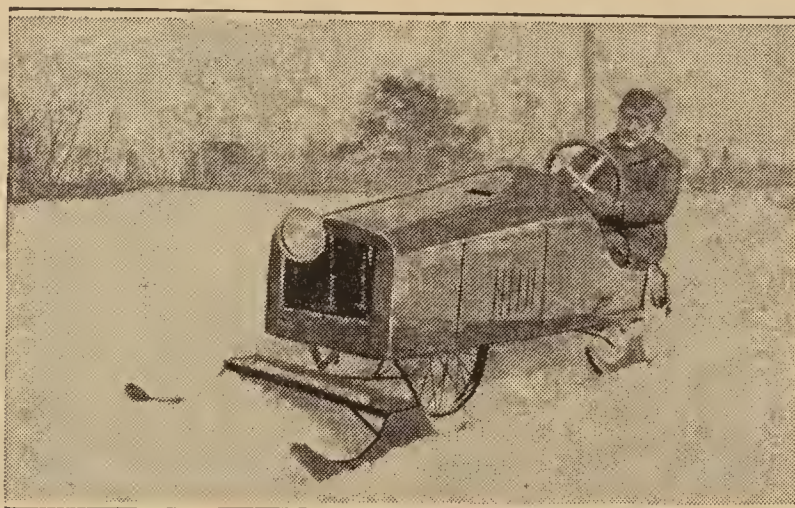
steering ropes running to the steering wheel, located immediately behind the

wheel hood, on the right-hand side of the sled. Footrests are provided on each side of the machine, and on the right-hand side, the brake lever is within easy reach of the driver's hand. The brake is simply a pointed steel lever, which digs into the ice when the hand lever is pulled back; the clutch-control lever is at the left of the driver's seat. The small tank seen on top of the engine, at the front, is a two-quart oilcan.

A somewhat similar sled, though less ambitious in design, is shown in the second photograph. This machine is



Driven by a Four-Cylinder Motorcycle Engine, This Sled Is Capable of Making Fast Time over Any Surface. The Frame is Made of Light Steel, and the Front Runners are Steered by Tiller Ropes from a Conveniently Located Steering Wheel



Built along the Lines of a Light Automobile or Cyclecar. This Machine is Driven by a Twin-Cylinder Motor. A Toothed Wheel, Which Adjusts Itself to the Surface Irregularities, Is the Propeller in This Type

driven by a twin-cylinder motorcycle engine, and is designed along the lines of a light automobile or cyclecar. The builder

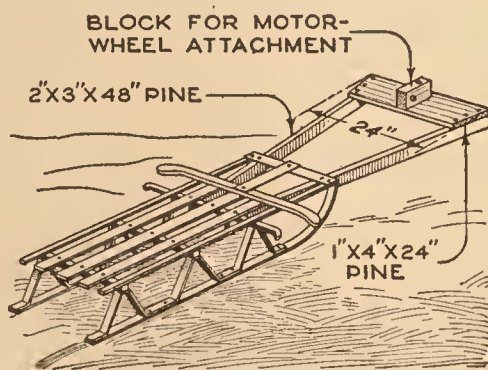


A Light and Easily Constructed Auto Sled Which Consists of Nothing More Complicated than a Motor Wheel Attached to an Ordinary Coaster

has used it on both snow and ice, and found it to be an excellent hill climber. The machine is 9½ ft. long over all, and the frame is made of light angle iron, with front and rear runners of wood. The chain-driven drivewheel, which is mounted as described in the first type, has short sections of 2-in. angle iron riveted around its circumference. The sled is guided by the front runners, through a regulation automobile steering post and drag link, which is connected to a steering knuckle fastened to the runners. The spark and throttle control are regulated from the levers on the steering wheel.

The simplest type of such sleds consists merely of an ordinary "coaster," to which is attached a motor wheel. The small drawing shows the framework to which the motor wheel is fastened; for this frame two pieces of pine, 2 by 3 by 48 in., and a crosspiece, 1 by 4 by 24 in., are required, in addition to a block attached to the crosspiece, and drilled for attaching the motor wheel, which is mounted so as to permit steering. This sled has attained a speed of 20 miles an hour on a level surface.

These illustrations and brief descriptions may stimulate interest in the fascinating winter sport of motor sleighing, and will also serve to crystallize the ideas of those who wish to build such a sled, and are hesitating as to the type to select. All of these designs have been tried out and found to be successful, and it is merely a matter of the builder's choice which one to select.



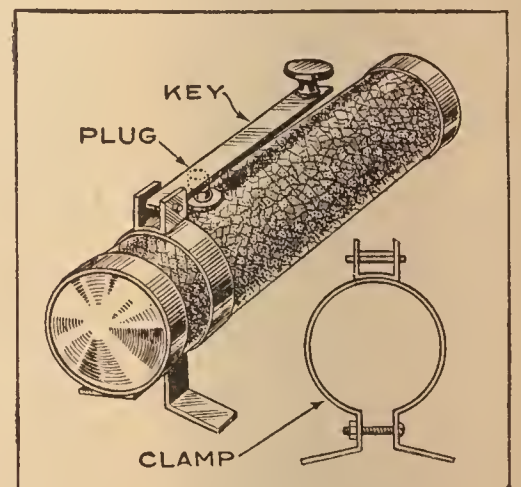
Transferring Pictures to Wood

Pictures from magazines may be transferred to wood, or other smooth surfaces, and so used in the decoration of boxes and similar objects. The surface should be given three coats of varnish and the transfer made just before the last coat has dried. Cut out the picture, trimming the edges closely. Place it, face downward, on blotting paper and dampen the back, and then on the wood, also face down. The paper backing is rubbed off in little rolls with the fingers; this is continued until the picture stands out with fair clearness; then permit the surface to dry. The picture will not be so clear, owing to the thin film of paper that covers it, and to bring out the design distinctly it is necessary to give the surface one or two coats of varnish. By this process the picture is, of course, shown reversed.

Signal Key for Flashlights

A flashlight offers a convenient means of night communication, by flashing the dots and dashes of the International or Morse codes. Certain types of flashlight, particularly those operated by a push button, can be fitted with a key which converts them into portable blinker sets.

The key may be made of any flat metal, and is secured to the flashlight by means of a clamp, as shown in the drawing, the ends of the clamp being formed into feet to keep the light in place, and prevent it from rolling. The key bar is fitted at one end with a suitable knob, and the opposite end has a small pin soldered to it, the ends of which fit into holes in the U-shaped part of the clamp. A short distance from the clamp, a small metal plug is soldered to the under side of the key bar, for depressing the flashlight button. No auxiliary spring is needed, as the spring of the button is sufficiently strong to raise the key.—George E. Perkins, South Bound Brook, New Jersey.



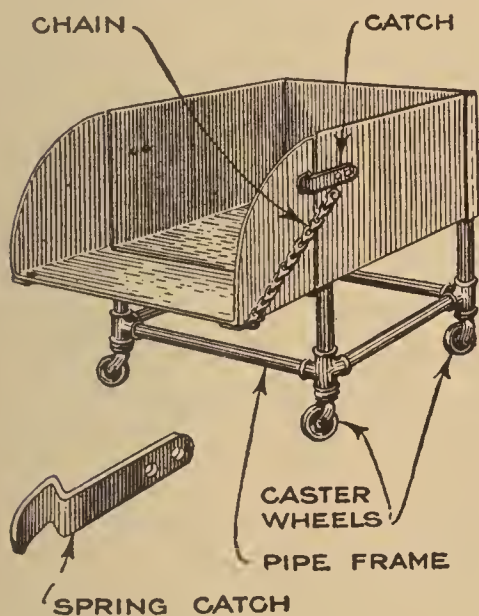
¶ By nailing discarded bottle caps to a board of the required size, a cheap and efficient foot scraper is easily made.

A Windshield-Cleaning Cloth

To prevent the accumulation of moisture on automobile windshields, the glass is rubbed with a tar-coated cloth. This cloth is made from a piece of cheesecloth, a yard square, which is coated with melted tar, applied with a brush. After the tar has cooled, fold the cloth until it measures about 4 by 6 in. To use, wet the glass and rub briskly with the cloth that part of the windshield it is desired to keep clear. This will prevent moisture from accumulating and keep the treated part of the glass clear. Do not wash the glass after the cloth has been applied and the water on it has dried.—F. C. Davis, St. Joseph, Mo.

A Coal Truck for the Furnace Room

A truck, consisting of a sheet-metal box mounted on casters, and with one side hinged so that it can be dropped parallel with the bottom, as shown in the drawing, provides an efficient and cleanly method of transporting coal from the pile to the furnace door. The side is raised when the truck is being filled at the coal pile, but when the truck is wheeled up to the furnace door this side is released and drops down, so that the coal may be easily shoveled from the truck into the furnace.



Substitute for Prepared Canvas

An artist, who was painting in the country, exhausted his supply of prepared canvas, and not wishing to wait for more from his base of supplies, cast about for a substitute. Thus he discovered that cream-colored window-shade cloth, which he obtained from the upper ends of some discarded blinds, answered the purpose admirably. The fabric was cut to the size desired, and the corners fastened to a drawing board with thumb-tacks. It took the oil colors in good shape, and aside from lacking the characteristic canvas texture, the results were as good as though canvas had been used.

Celery Grown in Drain Tiles

During last summer, an Ohio gardener placed on the market celery of such a



By Blanching Celery in Drain Tiles the Time and Labor Costs are Reduced

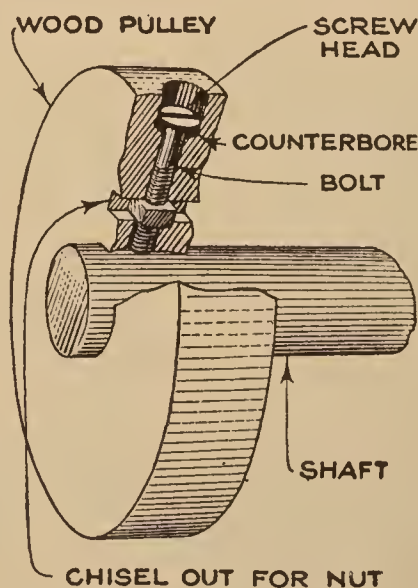
crisp and delicious nature that immediate sale was found for his entire crop. This superior celery was obtained by blanching it in ordinary drain tiles.

This method of culture calls for a slightly different plan of planting than the usual, the sets being placed in wider rows, which, however, may be several stalks wide. The plants are set about 6 or 8 in. apart, so that the tiles may be placed over them when they reach the proper height.—C. M. Baker, Wooster, Ohio.

Fastening Wooden Pulleys to Shaft

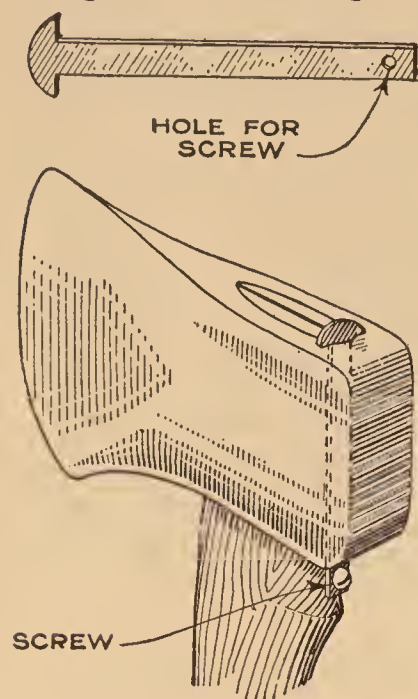
Wood pulleys for experimental purposes can be attached to shafts without injury, and can be moved along to any point almost instantly, by means of the setscrew arrangement shown in the drawing.

The center hole of the pulley should be made a close sliding fit on the shaft used. A machine screw and nut will be required, the former being inserted into a hole which is counter-bored to accommodate the head, as shown. The nut is inserted into a slot cut with a sharp knife, or chisel. In use, the pulley is slid onto the shaft, the nut inserted, and the bolt turned with a screw-driver until it picks up the nut and tightens the pulley on the shaft.—Curtis Ralston, Chicago, Ill.



Holding Ax Heads in Place

It is not always possible to tell when an ax head is fastened securely enough to prevent the possibility of accident,

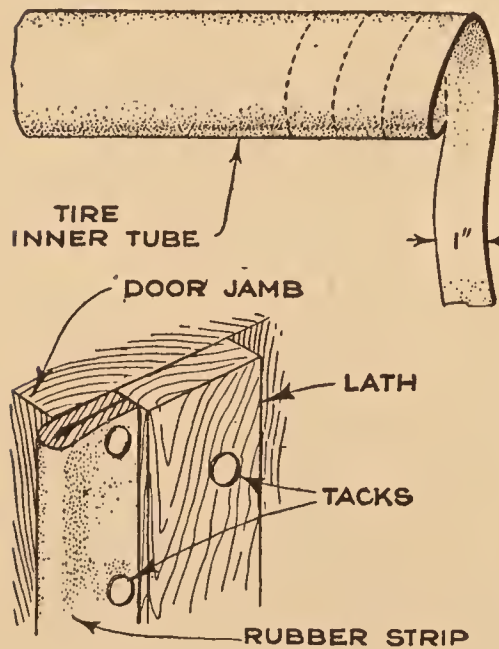


especially when using a heavy ax in winter; but by using the simple method shown in the drawing, the ax may be made permanently safe. A pin is made of $\frac{1}{16}$ -in. sheet iron to the pattern shown, and after the head has been wedged in place, the pin is driven in until the shoulder bears against the head. A screw

is then driven into the handle through the hole in the pin; this will keep the head from flying off, even if the wedges loosen and drop out.

Weather Strip Made from Inner Tubes

Old inner tubes may be cut into lengths and used as weather strips around doors



and windows to prevent the entrance of cold air into the house, thus conserving high-priced coal. The tubes are cut into spiral strips, about 1 in. wide, with a pair of scissors. These strips are then folded lengthwise and tacked to the door jamb; they may be reinforced by tacking ordinary lath behind them, as shown in the drawing.—W. S. Hutton, Fornfelt, Mo.

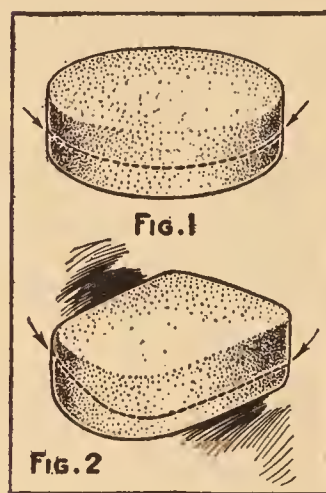
Vases from Orange Rinds

Charming vases that are peculiarly suitable for short-stemmed blossoms, such as pansies and violets, are easily made from orange rinds. The oranges are cut in halves and the pulp scooped out, without breaking the skin. The hollowed-out

rinds are buried in a box of dry sand, in such a way that the shape is retained. Place the box of sand in a warm place and allow it to stand for several days, or until the rinds have dried thoroughly. To make these novel vases stand upright, the bottoms are rubbed flat with sandpaper. The naturally fine, deep color of the vases is considerably enhanced by a single coat of varnish.

An Inexpensive Arch Support

Many persons suffer discomfort when changing from ordinary shoes to heelless, rubber-soled shoes. An inexpensive device that will allay this can be made from a porous rubber sponge. The sponge is divided as shown by the dotted

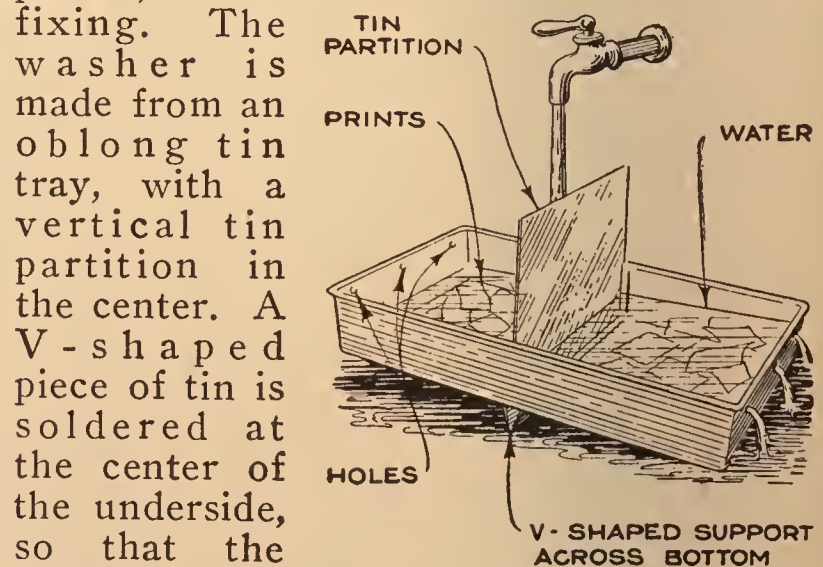


line in Fig. 1, and one piece is adjusted underneath the arch of each foot. The sponge will keep its position without attachment to the sole of the shoe, and can thus be used in several pairs of shoes. For those who are inclined to run over the heels on the side, a rectangular sponge is cut diagonally, as shown in Fig. 2. The cellular

structure of the rubber sponge provides ventilation and gives a gentle springing lightness to every step

Easily Made Print Washer

Amateur photographers will find the print washer shown in the drawing quite effective for removing hypo from their prints, after fixing. The washer is made from an oblong tin tray, with a vertical tin partition in the center. A V-shaped piece of tin is soldered at the center of the underside,

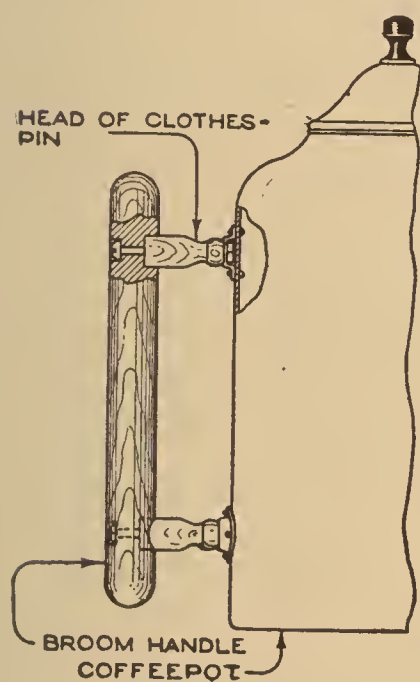


so that the washer can rock back and forth, and holes are made, near the upper edge, in each end of the tray, as shown. In use, the washer is set in the sink so that the vertical partition

will be under the center of the faucet, the unwashed prints are placed in the tray, and the water is turned on. As one compartment becomes filled the weight of the water causes it to fall and elevate the opposite end; at the same time the position of the partition is changed and the water is diverted into the empty part. As soon as a part of the water has run through the holes in the compartment first filled the washer tips over again, the operation being repeated as long as the water is allowed to run.—Wm. Underwood, Tunnel Hill, Ill.

Repairing the Coffeepot Handle

To save the price of a new coffeepot, the household handyman replaced a burnt handle by a new one in a few minutes. The new handle was made from a piece



of broom handle, and holes were drilled at the proper locations to take the bolts; these were counterbored for the bolt head and for the clothespins which were used as spacers. The heads were cut from two clothespins, and they were drilled through the center, as shown, to slip over the bolts. After all the parts

had been sanded and smoothed off, the handle was assembled as indicated in the drawing.—Chester Disque, Covington, Ky.

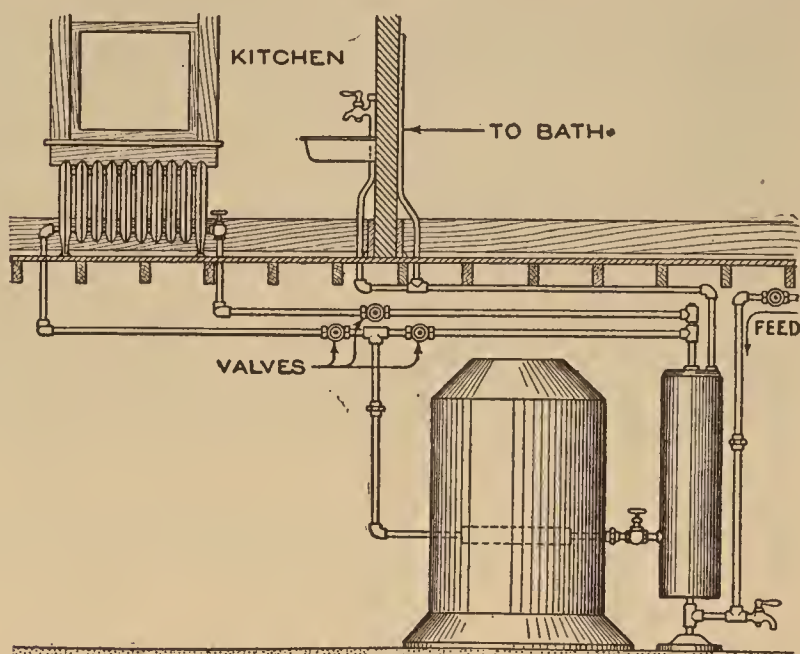
Avoiding Pump-Rod Breakage

To avoid the breakage of windmill pump rods in frosty weather, attach the rod to the windmill mechanism with a piece of chain a trifle longer than the stroke of the pump, if the rod with its fixed attachments is heavy enough to drop of its own weight, and fast enough to prevent the chain from slackening on the downstroke; if it drops too slowly, the mill will jerk on it when the chain tightens on the next upstroke.

With the rod heavy enough to keep the chain tight, as is generally the case, the pump will operate in normal weather. In frosty weather, when the rod begins to stick, it will finally stop at the top of the stroke, and the mill can run on without bending or breaking the rod.

An Auxiliary to the Heating Furnace

In order to reduce the consumption of coal required to keep his kitchen range going, a householder disposed of the



By Removing a Coal Range in the Kitchen and Substituting a Hot-Water Radiator, Several Tons of Coal were Saved by a Householder

range and installed a gas range in its place, the kitchen being kept at an even temperature by a hot-water radiator, which was connected to the furnace and hot-water supply system, as shown in the drawing.—J. A. Pearce, Camden, N. J.

A Convenient Lunch-Counter Sign

Instead of repeatedly answering the question as to what kinds of pie are available, the lunch-counter attendants may go on serving their customers without hav-

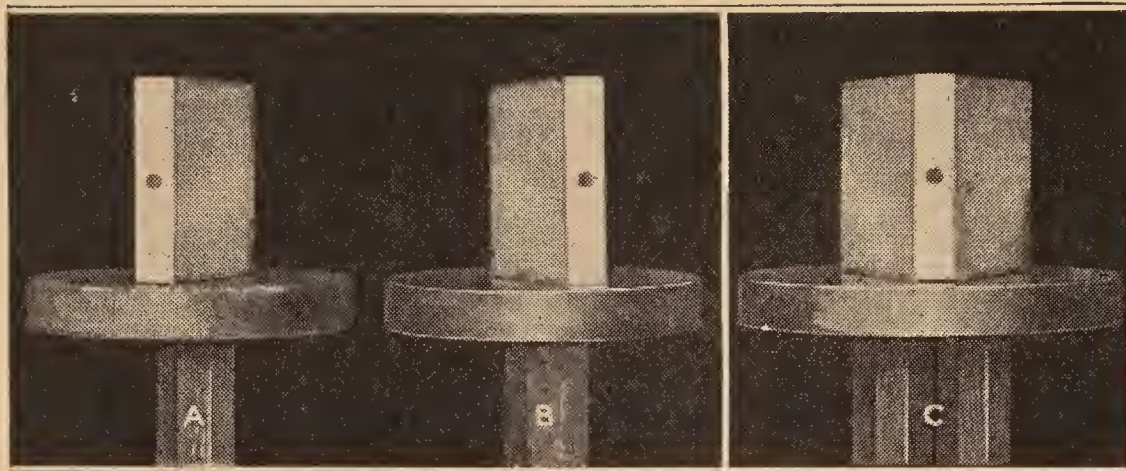


ing to stop and give the customer a verbal pie list, if a sign like the one shown in the drawing is used. The name of each item is painted on a hinged panel, the lower part of which is firmly attached to the back; a button holds

the upper part in position so long as that particular article is on hand. When the supply of any of the items is exhausted, the button is turned, and the upper half of the panel allowed to drop and cover the lower half, as shown, thus keeping the list up to the minute.

If Our Eyes Were Six Feet Apart

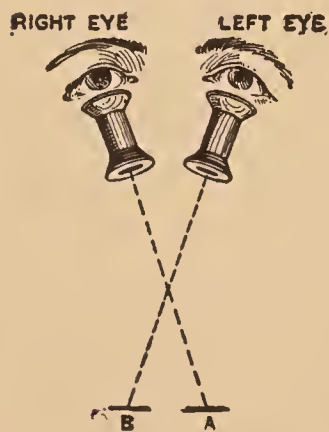
Does one's right eye see what the left eye sees? Certainly not, since it is not at



Photograph A Shows a Wooden Block as It would be Seen by the Right Eye Alone, If Our Eyes Were Six Feet Apart; B Is the Block as It would Appear to the Left Eye Only, While C Shows How It would Look could Both Eyes, Six Feet Apart, be Used Simultaneously

the same place. The eyes are approximately $2\frac{1}{2}$ in. apart, and so have different viewpoints of the same object. Let an object be photographed with the camera in a certain position and let a second photograph be taken from a point $2\frac{1}{2}$ in. to the right of the first position. These two views will correspond to the views as seen by the left and right eyes, respectively. A close comparison will show the difference. The mechanism of vision is such that the two impressions merge into a single effect, and the object is seen in perspective as a solid body in a depth of space.

Individual views of a block of wood as it would be seen by separate eyes 6 ft. apart, are given in photographs A and B. The former was taken from a point 3 ft. to the right of a point 6 ft. in front of the object, and the other from a similar point to the left of the object. These two photographs accentuate the difference in the



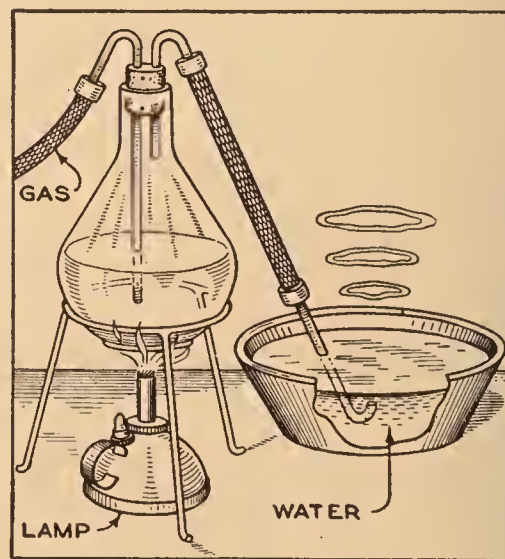
views as seen by the two eyes of an individual. To merge these two photographs into one, so as to give an effect of depth and solidity is simple. Select two large spools, holding them close against the eyes and looking through the holes of the spools so that the right eye sees only photograph A, and the left only B, as shown in the drawing. In a moment the objects will appear to move toward each other and there will appear to be but one object standing out in space in a rather startling way. The effect will be somewhat as indicated in photograph C, which is a print

made from the superposition of the negatives from which prints A and B were made, except that C lacks the appearance of solidity and depth. Such would be the appearance of the block of wood if one's eyes were 6 ft. apart.

In the absence of a stereoscope one may regard the usual type of stereoscopic view through a pair of spools as described, provided the card upon which the pictures are mounted is cut in two and the two photographs interchanged so as to place on the right side the photograph that was originally on the left side of the card, and vice versa. The picture as thus seen in perspective will, however, be reduced to apparently miniature dimensions, whereas when viewed through the common type of stereoscope it is magnified.—L. Pyle, St. Louis, Mo.

A Self-Igniting Gas

One of the most interesting of simple chemical experiments is the making of a gas which ignites spontaneously on exposure to the air. A glass flask is fitted with a cork bored to take two bent pieces



of glass tubing, one piece being long enough to reach within a short distance of the bottom of the flask, the other one coming just below the cork. The flask is about half filled with a strong solution of sodium or potassium hydroxide, and a piece of yellow phosphorous, about the size of a pea, is added. These materials must be prevented from coming in contact with the skin, as, owing to their caustic character, burns would result. The longest glass tube is connected to the house supply of gas, and the other is joined to a length of rubber tubing at the opposite end of which is inserted a second piece of glass tubing, as indicated; this is submerged in a basin of water. The flask is supported on a stand, and a

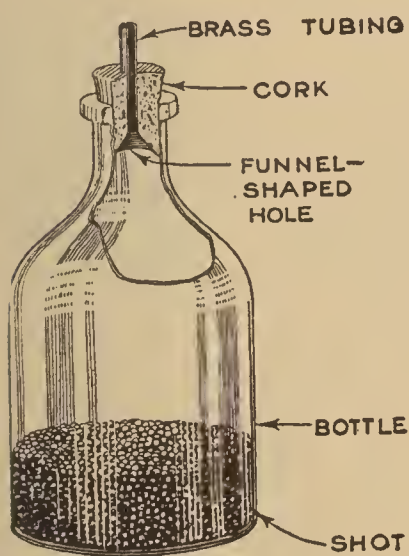
lighted alcohol lamp is placed underneath. The gas is turned on, and, as the solution in the flask begins to boil, the resulting mixture of gas and vapor is forced through the tube submerged in the basin. As soon as the bubbles reach the surface of the water they burst, and appear as rings which ignite as they come into contact with the air.

Corrugated Cardboard for Insulation

Corrugated cardboard of the kind used for packing cases can be used for insulating buildings against the cold, such insulation being particularly desirable in barns and poultry houses. The boxes are opened along the joints and flattened out, the material being applied with short nails and tin washers, such as used for the application of roofing paper.

Bottle for Loading Air Rifle

A loader for magazine air rifles, which drops the shot, one at a time, into the magazine, is made from a bottle, for holding the shot, and a short length of metal tubing, just large enough for a shot to



pass through. A hole is made through the center of the cork to permit the insertion of the tube. This is pushed through to within $\frac{1}{4}$ in. of the bottom of the cork, which is scooped out to make a small funnel, as shown in the drawing. The stopper is inserted

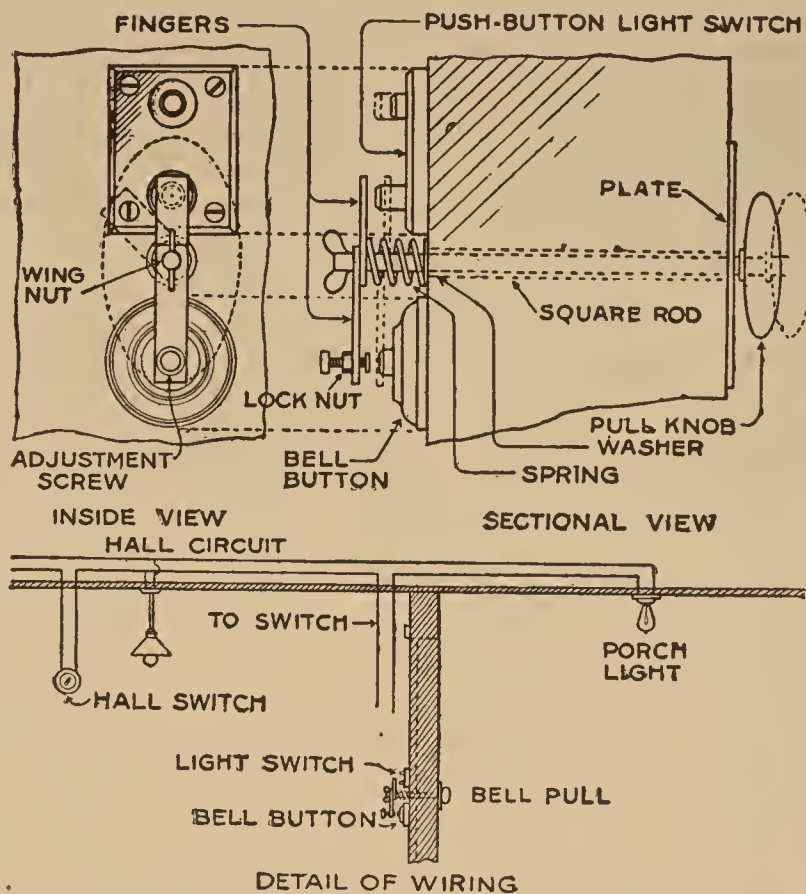
in the neck of the bottle containing the shot, and the rifle is loaded by placing the outer end of the metal tube in the magazine opening and inverting the bottle.

Ring the Doorbell Switches On the Porch Light

A doorbell button that switches on the porch light and rings the bell simultaneously, makes it possible to identify nighttime callers before the door is opened.

A hole is drilled through the wall, and if an old fashioned bell-pull is unobtainable, a door knob may be attached to the end of a piece of square rod, which should extend through the wall and about an inch on the inside when the

knob is against the outside of the wall. A small hole is drilled and tapped in the inside end of the rod. A flush push-



Pulling the Knob Rings the Doorbell and Turns On the Porch Light, Making It Possible to Identify Night Callers before Opening the Door

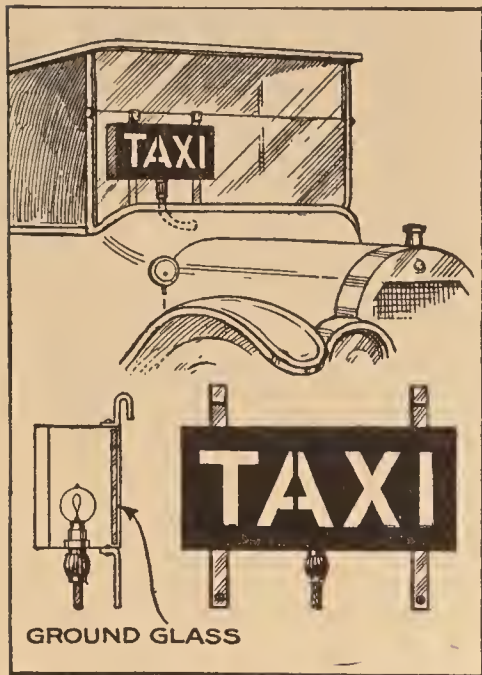
button switch is set into the wall about 1 in. above and in line with the hole; the bell button about the same distance below. The switch should be arranged so the lower button turns on the light.

Measure from the threaded hole in the end of the square rod to the switch and bell buttons. Make two iron fingers to conform to these measurements and drill a hole at one end of each for attachment to the rod with a wing-headed screw. A smaller hole is drilled in the lower end of the bell-button finger, to take an adjusting screw and locknut. A washer, or plate, having a square hole in the center, should be attached inside the wall to prevent the shaft from being turned and making the device inoperative. Before attaching the fingers, a light spiral spring is slipped over the rod between them and the wall for returning the knob to its original position for the next caller.

When the knob is pulled outward, the push button is depressed, ringing the bell; the switch button is pressed in, and the porch light is turned on, both at the same time. When the knob is released, the bell ceases to ring, but the light continues to burn. When the call is answered, the top button of the switch is pushed and the light turned off. During the day, the switch finger is turned to one side, permitting the bell to be rung without operating the switch.

Illuminated Windshield Sign

An enterprising taxicab owner rigged up the electrically illuminated sign shown

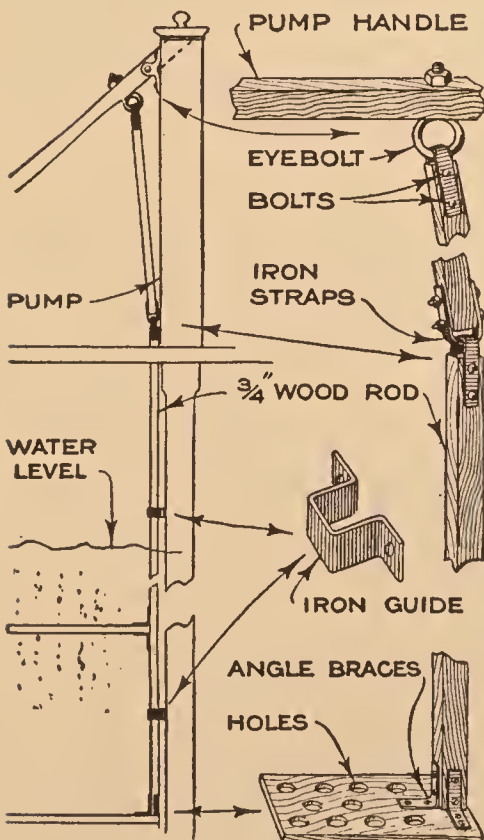


in the drawing, to indicate the fact that his car was available for public use. A tin case contains an electric globe which is connected to the battery by a dash socket. The word "taxi" is cut out of the metal front of the box, and a

piece of ground glass behind the letters makes the word conspicuous at night when the lamp is lighted. Hooks are provided at the top of the sign, by which it is hung inside the windshield, as shown in the drawing.

Agitator Aerates Well Water

On account of its lack of motion, and being shut off from light and air, the water in some wells becomes stagnant,



this condition being apparent by an objectionable taste and odor that is imparted to the water. By equipping the pump with the agitating device shown in the drawing, the water is stirred up and mixed with air at each motion of the pump handle, and stagnation is prevented.

An eyebolt is inserted into the pump handle 3 or 4 in. from the pump, and a short length of wooden rod is secured to the eye with a closely fitting iron strap; this short length of rod is attached to a longer rod by means of iron

straps, in the manner indicated. The lower rod should extend about 2 ft. below the high-water level of the well, and have a wood, or metal agitator attached to its lower extremity by angle braces; a similar agitator is placed 4 or 5 in. below the water level. Both agitators are drilled with holes to permit freer circulation of the water. At each movement of the pump handle, the agitators are worked up and down from 3 to 5 in., agitating and aerating the water.

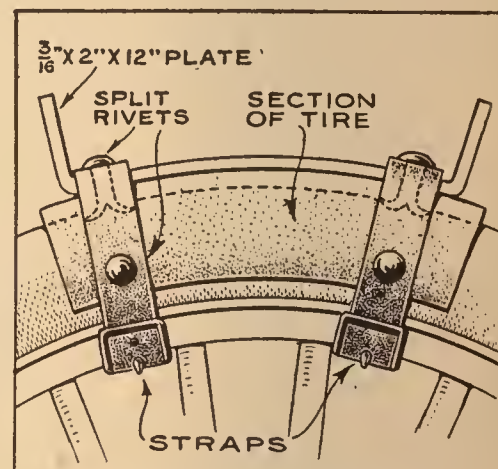
Pillows of Pine and Balsam Needles

Pillows filled with the needles of evergreen trees provide a fresh and agreeable perfume. The needles are stripped from the branches while green, or if this is not desired, the branches are laid away until the needles can be shaken off on a sheet.

A Traction Shoe for the Auto

To make a sand or mud shoe, for pulling the automobile from a hole or ditch, cut a 12-in. section from an old wagon tire, or similar piece of

iron, and after bending it to the shape shown, drill and rivet it to a section of old casing. Two straps added to the device provide a means for holding it onto the wheel, as shown in the drawing. Two or more of these shoes can be carried on the car, and can be applied even though the wheels are hub-deep in mud.



Second-Sight "Mystery"

Popularly, it is only the seventh son of a seventh son who is gifted with second sight, but by resorting to one of the tricks of the magician's trade, anyone can tell with absolute certainty the name of an article held before his blindfolded eyes.

Behind the curtain, the magician's assistant is equipped with an ordinary telegraph key, or push button, which is connected in series with a battery to the primary of an induction coil. Concealed wires run from the secondary winding to inconspicuous metal plates, 3 or 4 in. in diameter, on the stage floor. The magician must have metal heels on his shoes

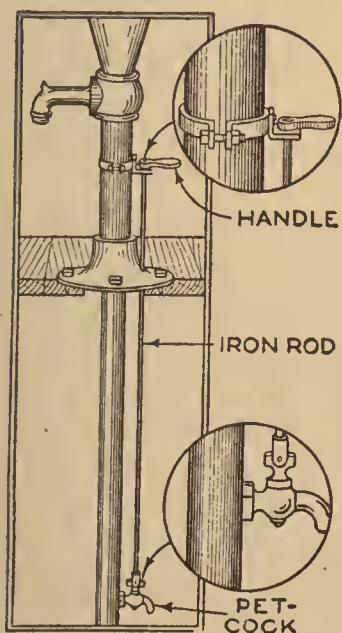
and stand with one heel on each plate. The assistant behind the screen may be equipped with a pair of field glasses, and then, when an object is held up to be identified by the blindfolded magician, its identity is conveyed to him by a series of shocks, in the form of dots and dashes, from the man behind the curtain, who is manipulating the key, or button, as a telegrapher.—L. H. Farinholt, Baltimore, Maryland.

Mandolin and Drum Effects on Piano

Passable imitations of a mandolin and snare drum are easily obtained on the average piano. The mandolin effect is obtained by placing a thumbtack on that part of each hammer which hits the string. The drum imitation is obtained by placing a sheet of paper, about 8 by 12 in. in size, between the hammers and strings of the first octave. By placing a thumbtack on alternate hammers in combination with the paper, the sounds of the piano, mandolin, and drum are produced simultaneously.—John J. Bormida, Jersey City, New Jersey.

A Handy Pump-Vent Attachment

To prevent pumps from freezing, by draining out the water that remains inside the cylinder, it is usually necessary to pull up the pump. The drawing shows a simple and most effective arrangement for draining the pump by merely turning an exposed handle. A hole is drilled and tapped near the bottom of the pump to take an ordinary petcock, which is operated from the surface by means of

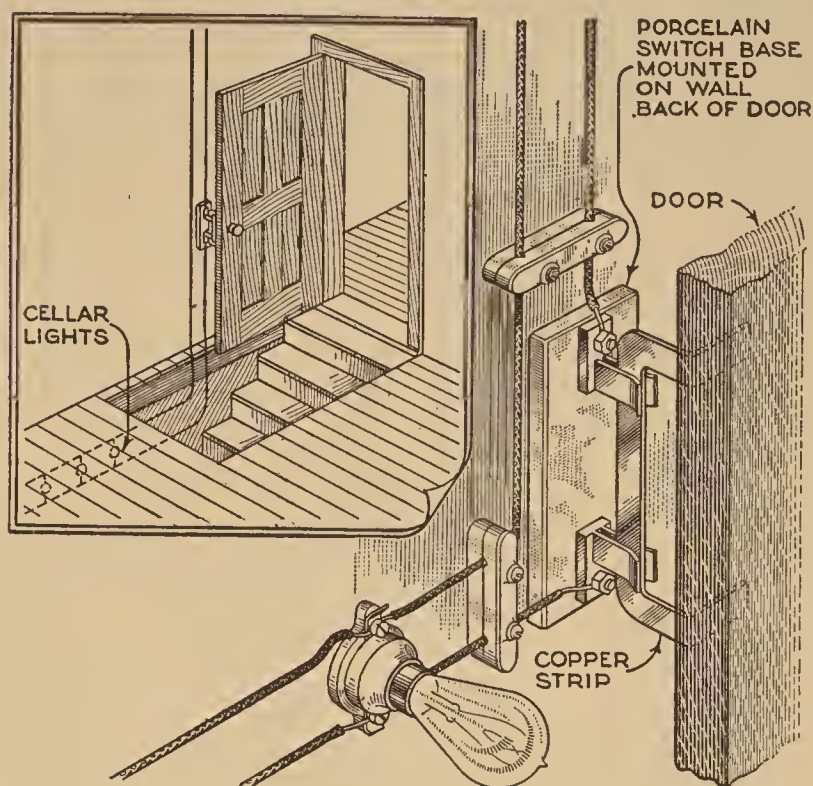


an iron rod, the forked end of which is fastened to the petcock handle with a rivet, or pin; a small hole must also be drilled in the pump base to accommodate the rod, as indicated. A simple clamp, fastened around the pump with stove bolts, is provided with a bracket through which the upper end of the rod passes; this end of the rod is filed square to

take the operating handle, which may be removed as desired. When it is desired to protect the pump against freezing, the petcock is opened, and the water in the cylinder is permitted to run out.

Cellar Door Operates Light Switch

To prevent the cellar lights from burning all night through the oversight of

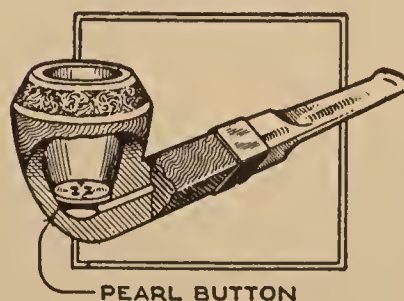


A Simple Switch for Cellar Lights, Which Prevents Any Possibility of Lights Burning When the Cellar Is Not in Use

some one who forgets to turn off the switch, the cellar door can be made to switch the lights on and off, since one rarely, if ever, forgets to shut it. A single-pole, porcelain-base switch is used for the purpose by removing the switch lever, and attaching an extra clip, as shown. This altered switch is mounted on the wall of the stairway, at the rear of the door, where it will be out of the way, and is connected to the circuit as indicated. A stationary switch bar is formed from a strip of stiff sheet copper or brass, and mounted to the back of the door directly in line with the switch clips, with which it engages and completes the circuit when the door is opened.

Button Prevents Sucking Tobacco through Pipe

Frequently the opening in the bottom of a pipe bowl becomes so enlarged through careless cleaning, that small

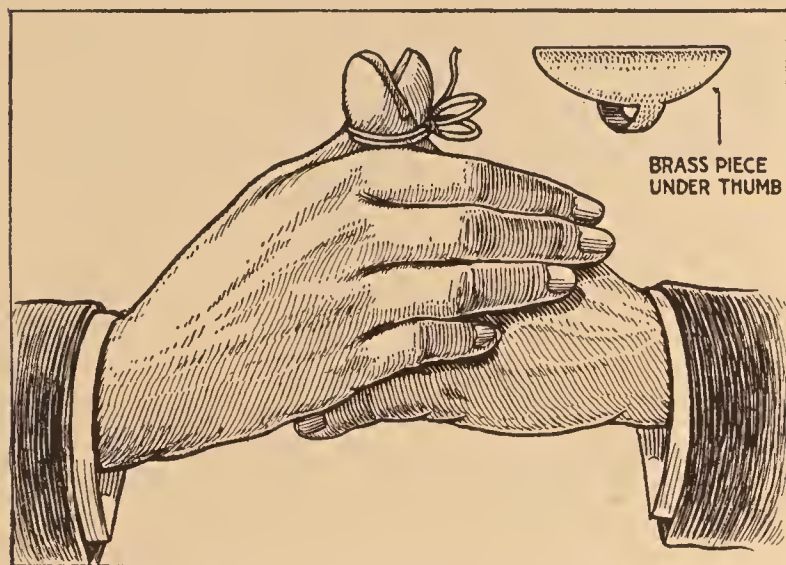


shreds of tobacco are sucked through the stem; the same thing happens when the tobacco runs to "shorts," that is when the longer shreds of the mixture in the pouch have been used. In order to overcome this fault, it is only necessary to insert a

perforated button snugly into the bottom of the bowl, as shown in the drawing. Such an arrangement permits the shortest kind of tobacco to be smoked without "slugs" being drawn into the mouth. If the pipe is of the bulldog, or curved, variety, the application of the button converts it into a reservoir pipe.—R. F. Hamil, Elkins, W. Va.

The Magic Thumb Tie

The prestidigitator crosses his thumbs and requests some one from the audience



"There Are Tricks in All Trades;" Catching a Hoop on the Arm, with the Thumbs Tied Together, Is One of the Magician's Tricks

to tie them together with a piece of tape, as shown in the drawing. A hoop is then thrown at the performer and, to the surprise of the audience, it is seen hanging upon one of his arms, although his thumbs are still securely tied.

The explanation of this, like most other tricks of legerdemain, is simple. A piece of sheet brass, or heavy tin, is made into the ring shown in the small drawing, to fit over the right thumb, the broad portion being next to the ball of the thumb; the tape is tied around this ring, the thumbs being crossed, so that the ring is on the underside of the thumb and quite without the knowledge of the person tying the knot. To minimize the possibility of detection, the ring is painted a flesh color. When the hoop is thrown, the performer quickly removes his thumb from the ring, catches the hoop on his arm and slips his thumb back into the ring too rapidly to be detected.—George N. Sleight, Saugatuck, Mich.

Enameled and Plated Traps

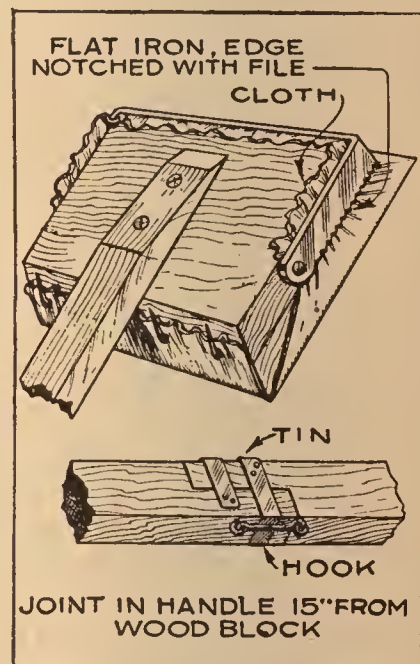
An Adirondack trapper has had several of his traps nickelplated, for setting in the snow, the outside surfaces being polished. It is his theory that plain iron traps, in spite of all treatment, still retain

a slight iron odor. Also, the iron trap shows dark against the snow and is more likely to cast shadows, even in moonlight.

A similar experiment, which gave good results, consists in enameling otter traps brown. Otter traps are set under water, and the brown traps are more nearly the color of the stones and débris in which they are set, and no particular care is necessary in setting them, while black-enamelled traps must be carefully concealed.—R. S. Spears, Little Falls, N. Y.

Cleaning Windows from Inside

By means of the simple device shown in the drawing, the outside of windows can be cleaned easily. Two blocks, one of which is slightly larger than the other and is beveled on three sides, are nailed together. One edge of the smaller block is provided with several sharpened hooks, and a light iron "latch" serves to fasten the wiping cloth tightly over the beveled edges, as indicated. The block is attached to a two-piece handle which is prevented from coming apart in use by a small hook and eye. The device is used from inside the room, the projecting beveled edges of the lower block making it possible to reach into the corners easily.—Frank E. Leitch, Brooklyn, N. Y.



Moisture on Spark Plugs Forms Short Circuit

Sometimes, on a hot summer day, the motorist is unable to get his engine going after prolonged effort, and just as he is about to give up and call the trouble man, the engine starts up. This is caused by the condensation of moisture around greasy spark plugs, when the car is kept in a place that is at a lower temperature than prevails outside. This moisture will cause a short circuit and make it next to impossible to start the engine. The remedy is to wipe the spark plugs clean and dry, and prevent the accumulation of grease on the engine.—L. A. Engel, W. Concord, N. H.



An Exhaust Water Heater

A western farmer, who used a gas engine to drive a dynamo, in the basement of his house, and realized that about 35 per cent of the heat value of the fuel was wasted, utilized the exhaust from the engine to provide hot water for various domestic uses.

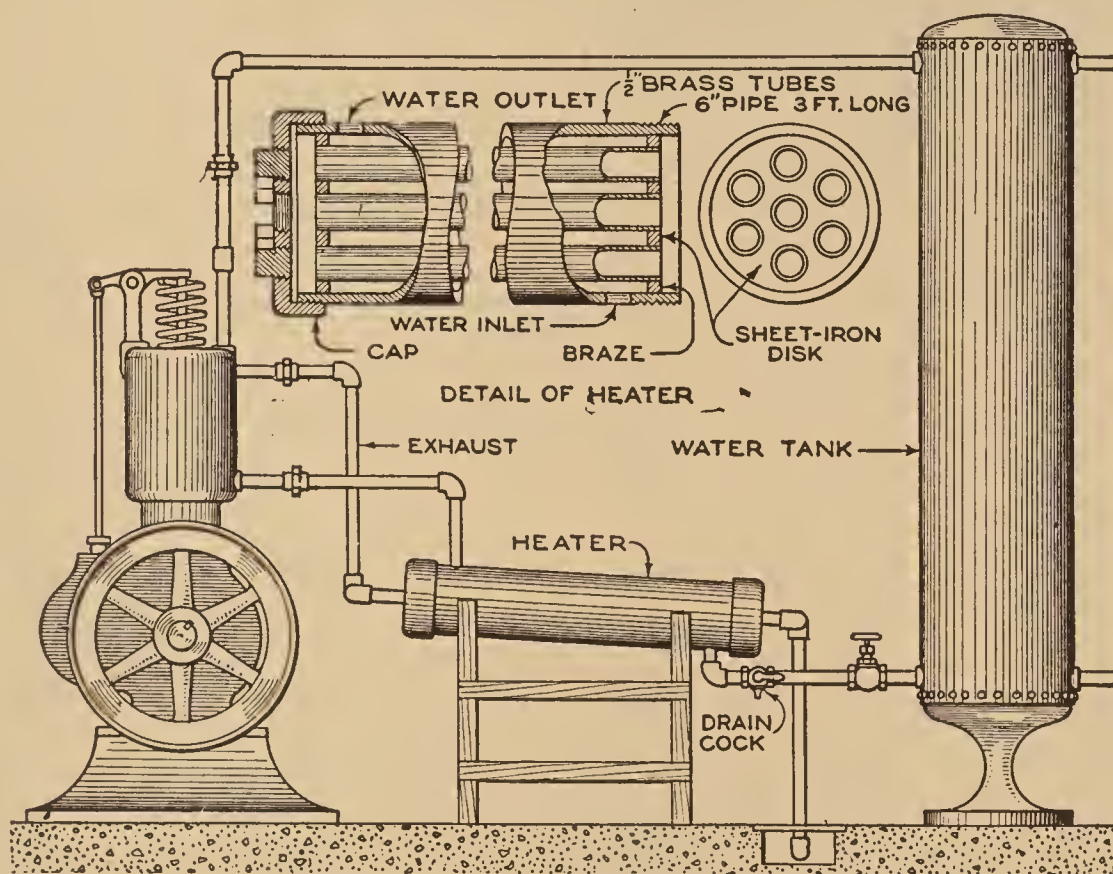
A section of 6-in. pipe, 3 ft. long, was threaded on both ends and provided with two pipe caps, the caps being drilled and tapped for $\frac{3}{4}$ -in. pipe. Two sheet-iron disks were

made to fit inside the 6-in. pipe, being drilled with seven holes each, for the reception of $\frac{1}{2}$ -in. brass tubes, as shown in the illustration. The sheet-iron disks were driven into place in the pipe, about 1 in. from each end, and the seven brass or copper tubes inserted and either expanded into, or securely brazed to, the disks; copper is the best material for these tubes, but brass will serve. The pipe caps were put in place and connections made to the engine exhaust as shown, the heater being mounted on a wooden support close to the engine. Holes are drilled and tapped in the body of the 6-in. pipe for the water inlet and outlet, the course of the water being in at the bottom of the heater, around the brass pipes, out at the top and around the water jacket of the engine to the top of the range boiler, and thence to wherever the hot water is to be used. The exhaust gases go through the brass

tubes in the heater, down to a trench in the floor, and outside the building. All joints should be thoroughly tested before running, and unions should be placed as

indicated to enable the device to be quickly disconnected. This heater effects a considerable economy by using the heat of the exhaust gases which would otherwise be wasted, and has given considerable satisfaction to the builder, who had tried several experi-

ments before evolving this device, which has amply repaid him for his small outlay.



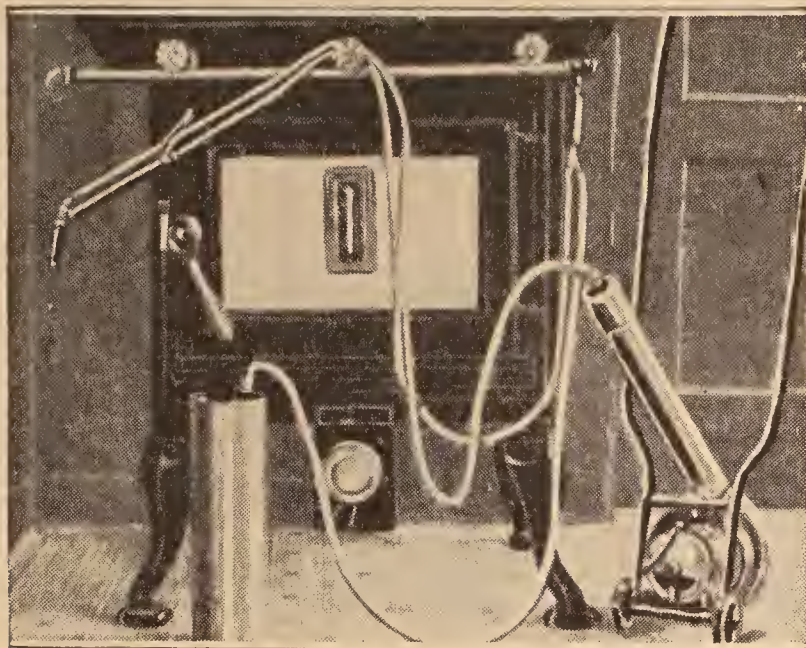
Exhaust Heater of Simple Construction Which Utilizes Heat Otherwise Wasted, and Supplies Hot Water for Various Uses around the Farm

A Glare Shield for the Reading Lamp

The effect on the eyes of the direct rays from a table reading lamp can be avoided, and a pleasing diffusion given by using a glare shield of some translucent material underneath the shade; this may be of parchment, oiled paper, or matt-surface celluloid. The shield may be supported on the shade brackets, or tape strips sewed to the edges of the shade will answer the purpose, and if such strips are applied to form a star, or other design, the appearance will be better. When the incandescent bulb can be removed without disturbing the shield, it might be permissible to sew a piece of tracing cloth or similar material directly to the edges of the shade.

Home-Brazing Apparatus

There is a fascination about accomplishing the unusual that makes working with high temperatures absorbing to the



Air under Pressure, Supplied from an Electric Vacuum Cleaner, Combined with Acetylene and Illuminating Gas. Produces a High Temperature

amateur mechanic. In most cases he has hesitated to undertake a job of brazing, or hard-soldering, because he lacks the facilities for producing air under pressure.

The photograph shows an arrangement by means of which the brazing blowpipe is connected to an electric vacuum cleaner by removing the dust bag and connecting the torch to the cleaner with rubber tubing. If only light metals are to be brazed, ordinary city gas will suffice, but if heavier work is attempted, higher temperatures will be needed. To produce the higher temperature demanded, the ordinary illuminating gas is enriched by the addition of acetylene gas from a small tank of the compressed gas, which is connected to the illuminating-gas supply by a "Y," as shown in the illustration. The pressure of the acetylene can be easily regulated by the valve on the tank.—C. A. S. Howlett, Utica, N. Y.

Making Vinegar without Fruits

An excellent vinegar of high acidity can be easily made without the use of apples, or other fruits, by a simple process. Three pounds of brown sugar are dissolved in 1 gal. of boiling water; this is allowed to cool, and 2 gal. of cold water are added. Two slices of toasted bread are spread on one side with compressed yeast, one cake of yeast being spread on each slice. The yeast-covered toast is put into the mixture of water and

sugar, which is placed in a stone crock or jar and allowed to stand for six weeks. The liquid is covered with a piece of cloth to permit the access of air. The acetous fermentation that results produces an excellent vinegar for table or pickling purposes.—Mrs. F. S. Hagans, Uniontown, Pa.

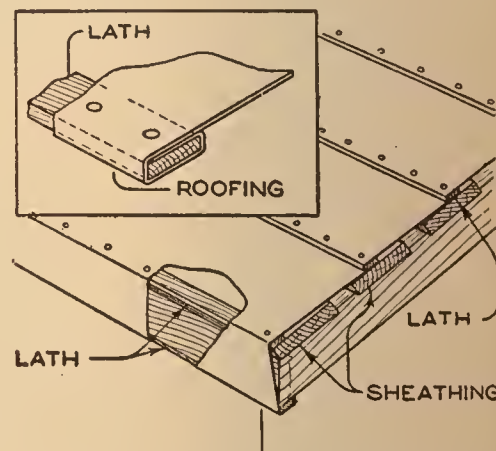
Carpet Beater Made from Old Hose

A first-class carpet beater can be made from a piece of garden hose and an old broom handle. The piece of hose, about 4 ft. long, is slipped over the end of the broom handle, which has been cut to a convenient length, and is fastened securely with tacks and a tight wrapping of wire; a groove cut just back of the end of the stick will hold the hose more securely, when the wire wrapping is applied. After it has been secured to the stick, the hose is split in three or four places, to within an inch or so of the handle; this will produce a beater that resembles a "cat-o'-nine-tails."

Laying Prepared Roofing like Shingles

Because prepared roofing is applied flat, with no lines to break the monotonous smoothness of the surface, roofs thus covered are rarely pleasing to the eye. However, roofing paper can be applied to imitate shingles in a simple manner. The strips of paper are cut in half, or smaller, as desired.

Starting at the eaves, as in laying shingles, the first strip is nailed over a lath to the underside of the eave. The upper edge is drawn up tightly and tacked to the roof in the usual way; then the next course is similarly applied, using lath or other strips to raise the material and give the effect of a course of shingles. Thatch-roof effects, which are now so much in favor, can be easily obtained with roofing paper by providing a curved base at eaves and gable facings over which the paper is applied.—Edward J. Calhoun, Chicago, Ill.



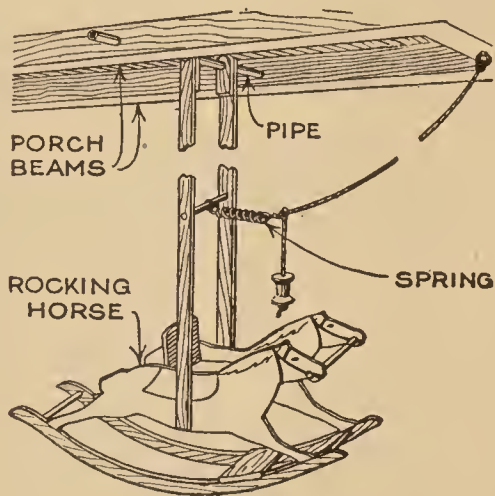
■ A nailset is much better than the usual long, awkward-handled burnisher to turn the edge of a steel scraper.

Ricing Potatoes through a Tin Can

A potato ricer, that produces mashed potatoes free from lumps, can be made from a tin can and an ordinary wooden potato masher. The rough edge of the can is first removed by heating until the solder melts. The bottom and sides are liberally perforated by using a nail as a punch, after which the burrs around the holes are smoothed off with a file. In use, the cooked potatoes are placed inside the perforated can, and the wooden masher, which should make a close fit, is inserted and pressure applied sufficient to mash the potatoes and force them through the holes in fine streams.—Paul Gorton, Big Rapids, Mich.

Rocking-Horse Porch Swing

A child's rocking-horse chair can be converted into a delightful porch swing in the manner shown in the drawing. Two lengths of 1 by 2-in. material, supported by a piece of



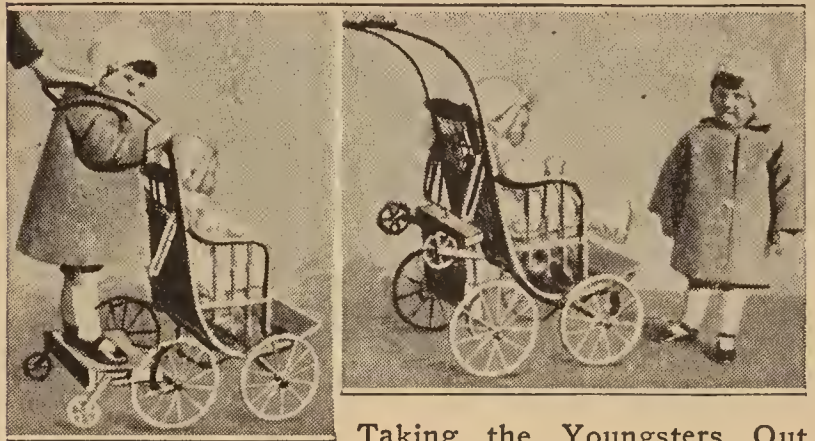
iron pipe, are used to suspend the rocking-horse from the ceiling. The top ends of the vertical strips are made of double thickness, to provide a better bearing on the pipe. If available, pieces of brass pipe can be used for bushings instead of the plain wood bearing against the iron pipe. By attaching a rope to the ceiling and to the swing with a light coil spring, as shown, the child is able to swing itself without assistance. The spring prevents the swing from being brought up with a sudden jerk. A large spool or wood handle is provided at the lower end of the rope for the child to grasp.—Chas. H. Willey, Concord, N. H.

Making Blueprints from Pencil Sketches

The usual method of making duplicate drawings is to make the drawing on thin paper and then have it blueprinted. If a piece of carbon paper is placed under the drawing, so that the ink from it will come off onto the underside of the drawing, a blueprint with much plainer details will be obtained.—Fred H. Quantmeyer, Westwood, N. J.

Doubling the Gocart's Capacity

There are times when the proudest parent is not enthused at the prospect of



Taking the Youngsters Out for an Airing is Facilitated by the Wheeled Platform Attached to the Rear of a Gocart. When Not in Use, It Folds Up

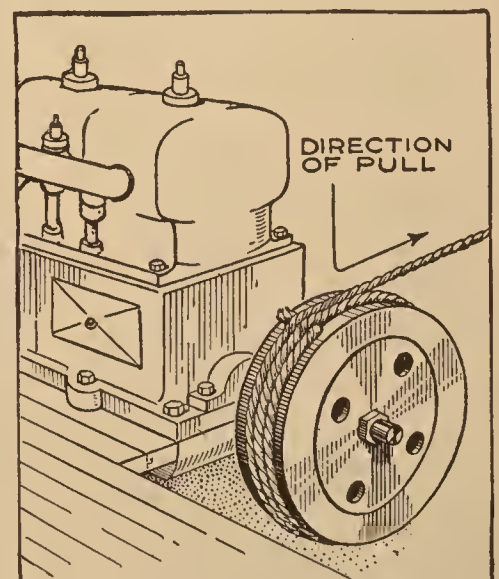
taking his offspring for an airing, pushing one in the gocart and leading another by the hand, for the young pedestrian soon tires and demands a "lift."

The photographs show how one father got around the difficulty; making the gocart haul two passengers instead of one, by adding a wheeled platform to the rear. This platform is attached to the rear axle of the gocart, and when not in use, it may be folded against the rear of the buggy and hooked up out of the way.—P. Sydney Tutte, Regina, Sask.

Rope Starter for Motorboat Engines

Turning over a four-cylinder, heavy-duty motorboat engine with a crank, to start it, can hardly be classed among light occupations; this is the type of engine in a number of naval launches of the present day, and it is from the navy that the trick of starting them with a length of rope comes.

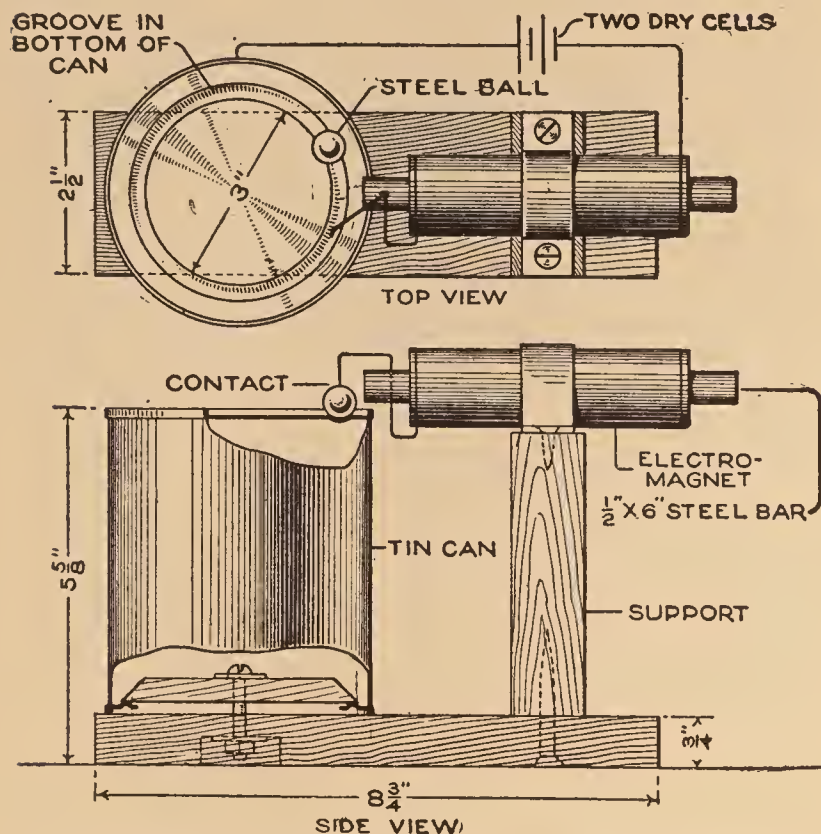
A 12-ft. length of $\frac{1}{2}$ -in. rope is given three or four turns



around the rim of the flywheel, as shown in the drawing; the end of the rope is gripped by two men, and a rapid pull will turn the engine with sufficient speed to start it, without danger of backfiring. This idea can be applied to stationary engines, tractors, and, in some instances, to automobiles.

Steel-Ball Motor Operated with Dry Cells

An interesting electromechanical toy may be made from a $\frac{1}{2}$ -in. steel ball, the



By Harnessing Magnetic Attraction, a Steel Ball is Made to Revolve at High Speed in a Groove in the Top of a Tin Can

grooved bottom of a tin can, and a battery-operated magnet. The magnet consists of two layers of bell wire wound around a $\frac{1}{2}$ by 6-in. iron core. It is mounted as shown in the illustration. A tin can having a circular groove, 3 in. in diameter, is inverted and fastened to the base. The battery is connected to the can, and to the far end of the magnet. The other wire of the magnet, next the can, is left bare and tied securely to the magnet bar with a string. The wire is bent to form a brush over the center of the groove, varying from $\frac{1}{4}$ to $\frac{1}{2}$ in. from the iron core, which is placed as near to the steel ball as possible while still permitting it to roll by. To operate the motor, the ball is placed in the groove and given a push. As it touches the wire the current flows through the can, the steel ball, and the contact wire to the magnet. The magnetism vigorously attracts it but then the circuit is broken and the ball rolls around the can by the momentum it has gained. A continuation of the same operation keeps the ball spinning.

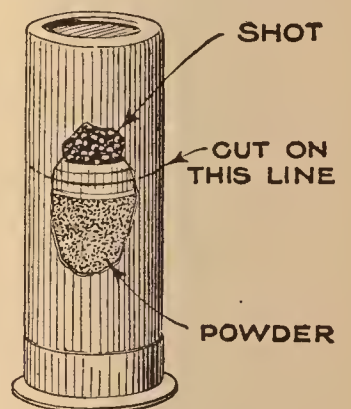
Waxing Brush Aids in Refinishing Floors

Tiring of a policy of watchful waiting, a housewife resolved to tackle the refinishing of her hardwood floors. From a friendly hardware dealer she borrowed a heavily weighted and long-handled wax-

ing brush. The bolts that hold the weight to the brush were loosened, and the brush was covered with a sheet of emery cloth, the ends of which were inserted between the brush and weight and the bolts drawn up, fastening the abrasive cloth. Thus equipped, the brush was worked back and forth over the floor as in polishing, to remove the old varnish and brighten up the bare spots. After the old finish had been entirely removed, the surface was wiped clean with a dry rag, and three coats of varnish were applied at intervals of 36 hours.—Kate H. Brower, Parshall, N. D.

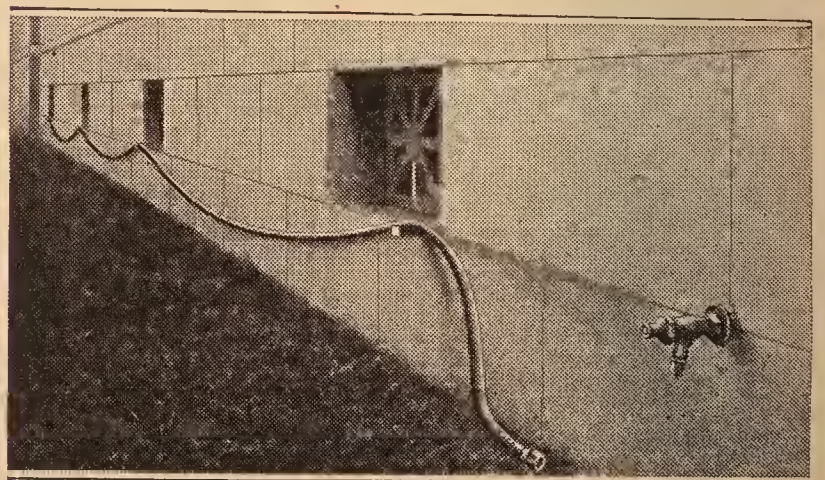
Shot Cartridges for Big Game

Once in a blue moon the small-game hunter has an opportunity to take a shot at a deer, or bear, but realizing the futility of killing the game with a scattering charge of birdshot, allows it to escape, or discreetly withdraws. One hunter successfully bagged a big black bear with a single-barrel shotgun and shot cartridges, by cutting his cartridges as shown in the drawing. When such a shell is cut, as indicated, the entire chunk remains intact until it hits and is, of course, more effective against large game. While this plan works successfully with a cylinder-bored arm it cannot be used with a choke-bore gun.—Philip G. Bernholz, E. Orange, N. J.



Supports Hold Hose When Not in Use

With the present high price of rubber there is a chance to make garden hose last longer through the idea shown in the engraving. The rack along the wall is easily constructed, and when not in use,



A Simple and Inconspicuous Rack along the Side of a Building Saves Time and Prolongs the Life of the Hose

the hose is placed on it, after being drained. The time required for placing the hose on the rack is far less than is spent in winding it on a reel.

Wedges Prevent Tipping of Rocker

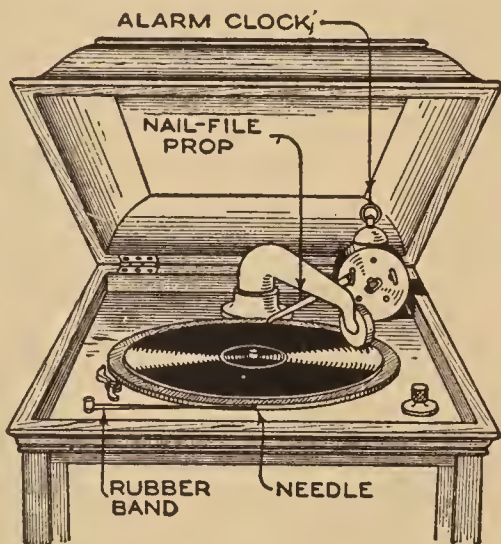
Pick out the baby's favorite rocking-chair—the one he rocks so hard that some member of the family is kept busy watching to see that he does not go over backward—and fit wedges underneath the rockers, at the ends, so that they will check the rocking. The size of the wedges depends on the curve of the rocker; they may be held in place by screws or glue, and stained to correspond with the finish of the chair.

A Phonograph Alarm Clock

A novel, yet simple combination of alarm clock and phonograph, for those who would prefer awakening to the strains of music instead of the unmelodious alarm, may be arranged as shown in the drawing.

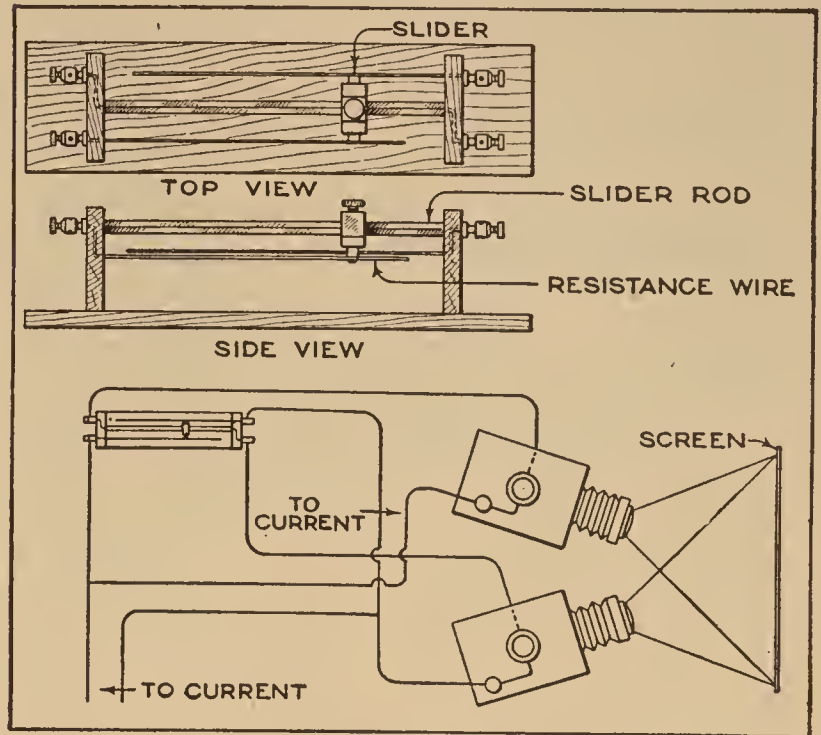
A loud record is placed on the turntable, the needle set in the first groove of the record, and the machine wound up ready for operation. The clock is set in the corner of the cabinet, with the alarm-winding key in a vertical position, and a nail file, or similar prop, is set against the key, the lower end being caught against the felt top of the turntable in a position to prevent its rotation. The stop lever on the machine is now released so that only the prop prevents it from playing. As can be seen, when the alarm releases in the morning, the alarm key turns away from the prop, allowing it to fall and thus starting the machine.

If the friction of the needle on the record prevents the machine from starting, push a needle under the felt of the turntable, leaving about $\frac{1}{8}$ in. projecting; loop a rubber band over a thumb-screw in the cabinet top, or under a thumbtack, and stretch the other end to catch the needle as shown; this will give the necessary impulse to start the machine.—D. W. Stewart, Indianapolis, Ind.



A Switch for Producing Dissolving Views

Many persons who operate postcard projectors find the alternate lighting and



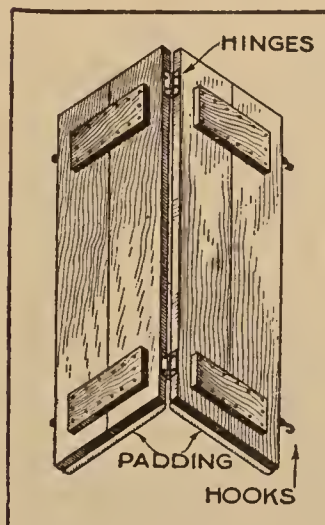
A Simple Sliding Switch Which Produces a Dissolving Effect for Use with Postcard Projectors

darkening of the screen tiring to the eyes. The drawing shows a simple switch by means of which a dissolving effect is obtained. The switch, as illustrated, is made from parts of an old tuning coil of the double-slider type. On each side of the slider rod a length of resistance wire is arranged so that it will be in contact with the slider at all times. The switch is connected to the two machines which will be required, as shown in the drawing. As the location of the slider is changed the light in one projector gradually fades, and is finally extinguished, while the light in the other becomes brighter.—Philip A. Wall, Bedford, Mass.

Homemade Trousers Press

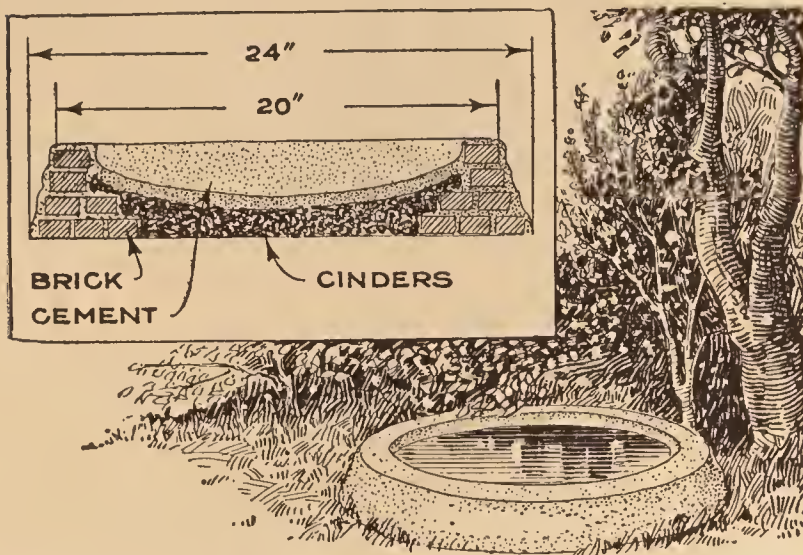
With the press shown in the drawing, it is possible to preserve the well-pressed appearance of the trousers that careful

men require at a minimum of expense. With the arrangement shown in the drawing the garment, folded so as to preserve the old creases, is placed inside the press, which is held together by the hooks and provided with screweyes for hanging.—Chas. Worcester, Webster Grove, Missouri.



Bird Bath of Brick and Cement

Many lovers of wild birds have on their grounds a "wild corner," which is usually planted with native wild shrubs, vines, and



The Bird Lover will Find Himself Amply Repaid in the Society and Friendship of His Feathered Pals by Providing Them with Drinking and Bathing Facilities

flowers. The birds like such surroundings and both the birds and their friends would enjoy it more if a bird bath were provided. There are any number of ideas along this line, but the bird bath built by one admirer of the feathered songsters has the merit of blending well with its surroundings and being economical to make. A circular form of old bricks was made about 14 in. high and 2 ft. in diameter at the base, tapering to about 20 in. at the top. The brick form was filled with cinders to within a few inches of the top, leaving a depression which sloped from 5 in. at its deepest point to about $\frac{1}{2}$ in. below the rim. In this way bathing and drinking accommodations are provided for birds of all sizes, from a wren to a flicker. The whole structure was covered with a coat of one part cement to three parts of clean sand. Both the inside of the basin and the exterior are finished rough, and when completed, the whole has the appearance of a large boulder that harmonizes well with its surroundings.—Mrs. Lillian S. Loveland, Lincoln, Neb.

Playing Phonograph Music at a Distance

For the entertainment of a sick person it was desired to reproduce the music from a phonograph in another part of the house, without moving the instrument.

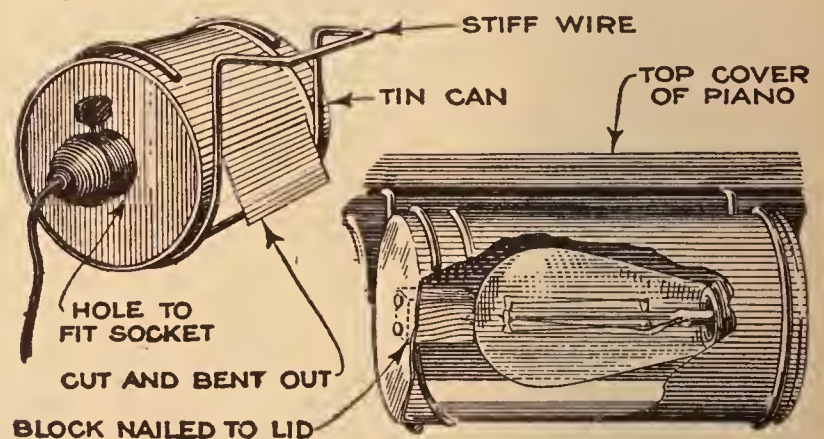
This was accomplished by firmly tying a sheet of stout wrapping paper over the top of a metal dish. Through the middle of the drumhead thus produced, a small hole was made and a silk thread passed

through and knotted on the underside to prevent it from slipping out. The paper was then wetted thoroughly and permitted to dry, making a very tight diaphragm. Allowing sufficient thread to reach from the phonograph to the side of the bed, the other end was tied to the needle bar of the reproducer, near the center. By moving the dish, the thread was stretched taut, and the phonograph then started, the tone issuing from the improvised reproducer in astonishing volume. Variations of this experiment will readily suggest themselves.—Charles I. Reid, Millersburg, Pa.

An Electric Piano Lamp

An electric piano lamp, to reflect the light downward upon the score in the darkened interior of theaters and similar places, is easily made from an ordinary 1-lb. coffee can, about 4 in. in diameter and 6 in. tall.

A hole, just large enough to fit over the threaded part of the socket, is made in the bottom of the can, and a small block of soft wood is fastened to the underside of the lid, as shown in the drawing. A small depression is made in the end of the block, in which the tip of the bulb fits, to hold it in a horizontal position. With a can opener, or chisel, a three-sided cut, about $2\frac{1}{2}$ in. wide and 5 in. long, is made, the metal is opened out as shown, and the edges smoothed off with a file.



An Electric Piano Lamp, for Reflecting the Light Downward upon the Score in Dimly Lighted Situations, is Quite Easily Made from a Tin Can

A suitable bracket can be made of stiff wire for holding the lamp, as shown in the drawing; this type can be used if the top cover of the piano is not to be raised, but if it is, a hook must be provided to fit over the edge of the piano cabinet.—J. A. Stevens, East Boothbay, Me.

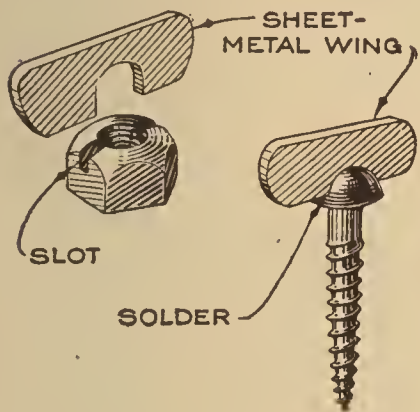
¶To clean a chamois skin, soak it in a weak solution of sal soda, then in soap suds for two hours; rinse in clear water, and finally in a solution of soap and soda, and hang up to dry.

Keeping Overshoes On in Muddy Roads

Persons who travel over muddy roads and paths experience trouble and inconvenience because their overshoes become stuck, and pull off. This annoyance can be overcome by sewing a small flap, or tab, to the back of each rubber, which buttons over an ordinary shoe button secured to the back of the shoe.

Homemade Wing Nuts and Screws

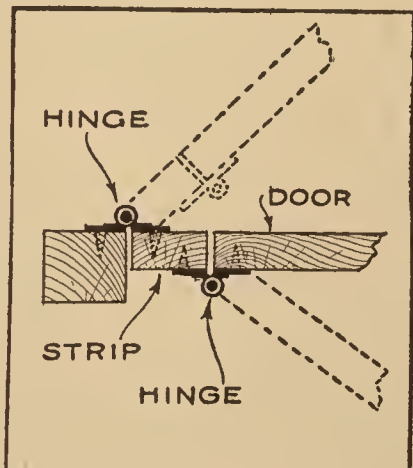
Occasionally, the amateur mechanic has use for a wing nut or screw, when none is available. If a piece of sheet brass or other stiff sheet metal is at hand, serviceable wing nuts and screws may be easily made from ordinary nuts and screws, as shown in the drawing. If a wing nut is needed, the nut is



slotted across the top with a hacksaw, and a piece of sheet metal, cut to fit, is set in the slot and soldered. In some cases a washer cut in half makes a good wing. If the bolt extends beyond the nut, a piece may be cut from the wing to make room for it. Similarly, wing screws may be made by setting the wing into the screw slot and soldering.

Making Double-Acting Spring Hinges

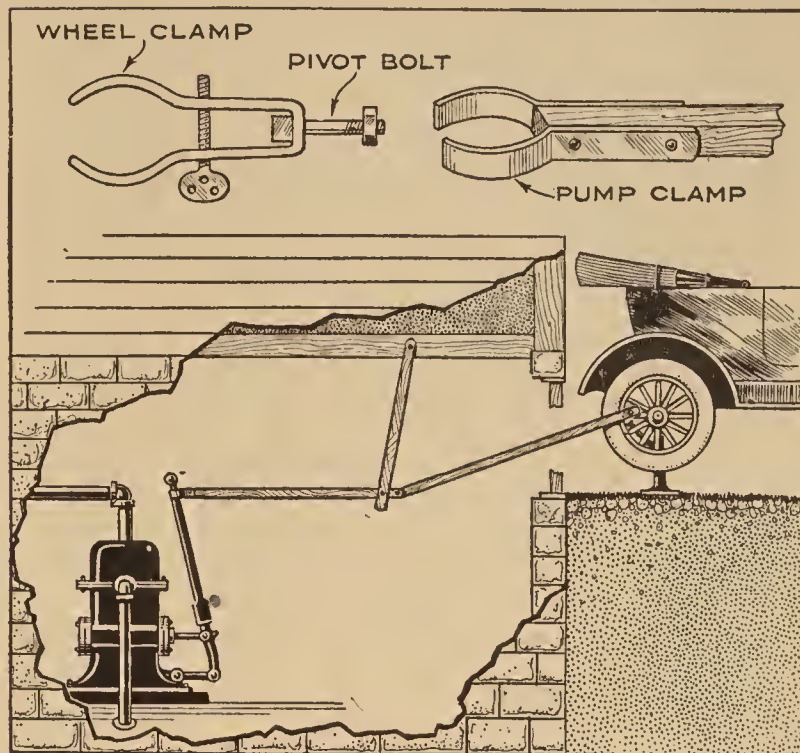
Just when a pair of double-acting spring hinges was most needed the small-town hardware dealer happened to be "out" of that particular item. Rather than wait until the stock was replenished, the customer bought two pairs of ordinary spring hinges, such as used on screen doors, and applied them for his purpose, as follows:



A 2-in. strip, the length of the door, was cut and fitted, as shown in the drawing, with one set of hinges on each side of the door and on opposite edges of the strip. Both edges of the strip and door must be planed perfectly square with the face, otherwise the door will stand ajar.

Automobile-Operated Force Pump

Many farm and suburban homes are supplied with running water which is



Pumping Water from the Basement to a Storage Tank in the Attic is Made Less Laborious by Harnessing an Automobile to the Pump

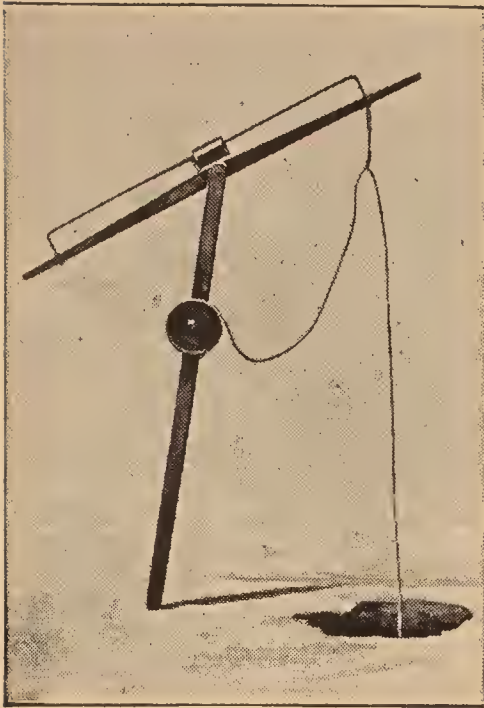
pumped from the basement with a force pump to a storage tank in the attic. The system is simple, but if any great amount of water is to be pumped into the tank the job soon becomes laborious. The drawing shows how an automobile was arranged to operate the pump. A simple pump jack, made of hardwood strips, was arranged as shown. One of the rods was brought out through a basement window and attached to one of the rear wheels of the car by means of the clamp shown in the drawing. The rear wheel of the car is jacked up from the ground, the engine thrown into gear, and run at a slow speed. The clamp which attaches the pump rod to the wheel should be long enough to clear the hub cap of the wheel.—G. E. Hendrickson, Argyle, Wis.

Water Rheostats in Series

A simple water rheostat can be made from two dry-cell carbons, held about 3 in. apart by a clamp made from two strips of wood, stove bolts being used at ends and center. The carbons are immersed in a glass jar filled with salt water. The binding posts on the carbons provide a quick and convenient means of connecting the resistance to the circuit. A battery of such rheostats can be made, and the required amount of resistance obtained by connecting them in series to a switch having a point for each rheostat.—Chas. Waller, Montreal, Que.

A Tip-Up for Winter Fishing

A tip-up for fishing through holes in the ice is of considerable convenience to the fisherman, as a number of such de-

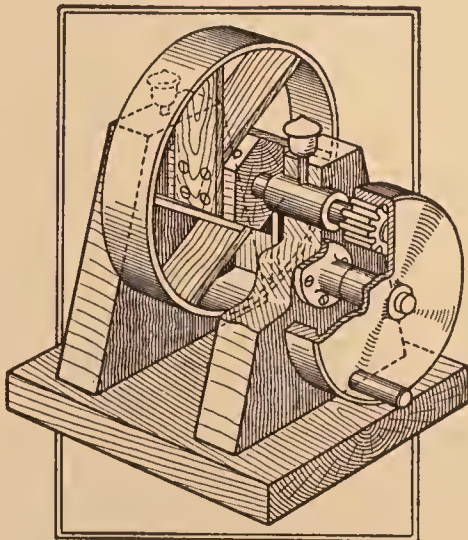


vices may be set and looked after at one time. The tip-up shown in the photograph is made by joining two hard wood sticks at right angles to each other with a small bolt, so that the cross-piece swings freely; one end of this piece is painted red and the

other black. The lower end of the vertical stick is sharpened. A bicycle spoke is bent, as shown, and fitted into holes drilled in the crossarm, to which it is attached with small nuts. A sliding weight on the wire keeps the crossarm from tipping downward until a fish takes the hook and runs off with the line. The reel to accommodate additional line is a refinement that may be added or omitted as desired.—Harry F. Blanchard, S. Glens Falls, N. Y.

Hand-Power Device Made from Old Lawn Mower

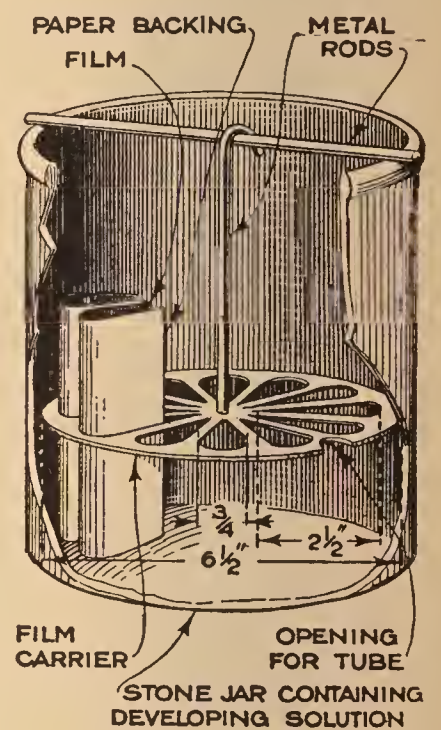
For operating small machines, such as grinding and polishing arbors, electric generators, and the like, an efficient hand-power device can be made from an old lawn mower, as shown in the drawing. The gears from one end of the cutter are removed, and the smaller one is attached to a shaft of suitable size with a pin, or key; this shaft is supported by wooden up-rights, as indicated, and turns in bearings made of brass tubing. The large internal gear is mounted on an arbor, so that the teeth of the two mesh properly, and a



handle, for turning, is provided, as shown. A flat or grooved pulley of suitable dimensions is attached to the shaft between the uprights, for transmitting the power to the machine to be driven. With a device of this character comparatively high speeds are obtainable.—James P. Lewis, Golden, Colo.

Holder for Developing Cut Films

A film-pack developing tank may be easily and cheaply made from a stone jar and a metal carrier for the films. The film carrier is made from a disk of some stiff metal, preferably aluminum, on account of its resistance to corrosion. A hole is drilled at the center of the disk for the lifting rod, and 12 openings, such as shown in the drawing, are made for holding the films. The individual films are placed in the openings of the carrier, which is then lowered into the jar containing the developing solution, and moved up and down several times to break up any air bubbles that may adhere to the surface of the films; then the lifting rod is hooked over the other rod, and the development is allowed to proceed. The films are put into the openings of the carrier so that the film is inside and the black-paper backing outside, against the sides of the opening. The carrier shown in the drawing will hold a dozen 4 by 5, 3 1/4 by 5 1/2, or 5 by 7-in. films; but may be made to accommodate any size films by enlarging or reducing the size of the openings. Such a tank will develop, fix, and wash the films. The developing and fixing baths are removed by turning the jar on its side, and the washing is best done by running water from a faucet through a tube to the bottom of the jar. A round hole, the size of the tube, may be cut in the film carrier if there is insufficient space between the side of the jar and the carrier.



☐ Saddles should be suspended from the horn, or placed on a saddle rack, to prevent bending and twisting of the skirts and straps.

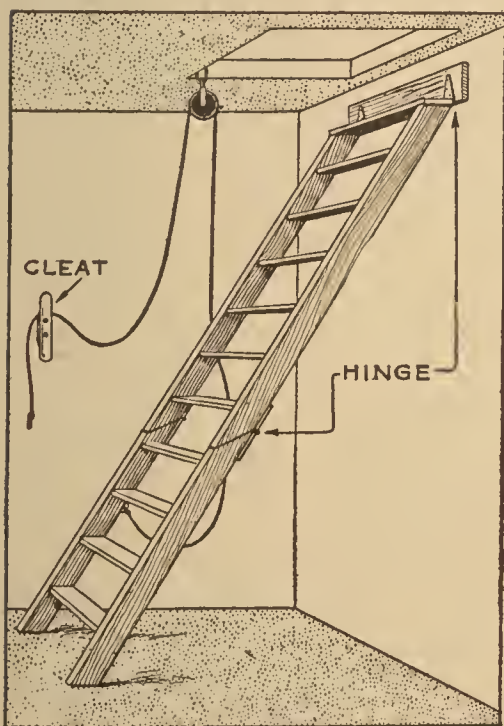
Hanging Poultry-House Doors

Most builders of poultry houses err in making the doors too narrow and locating them too close to the floor. The door should be not less than 4 ft. wide, so that a wheelbarrow can be used at cleaning time, and at least 1 ft. above the floor level; if it is near the floor, litter accumulates behind it and there is difficulty in opening and closing it.

The wide door, opening outward, can be supplemented by a netting-covered door just within. In summer, and during favorable winter weather, the solid door can be hooked back and the screen door used to brighten up the interior and permit an airing. Double-acting hinges on poultry-house doors are becoming justly popular, and are certainly a great convenience for the attendant with his hands full, as they are likely to be at feeding time. An overhead pulley and a weighted rope make a simple closing device. The attendant pushes the door open, in whichever direction he is headed, and the weight closes it after him.

Folding Attic Steps

The steps shown in the drawing are particularly serviceable when the opening to the attic is located in a closet, or small room, where there is insufficient

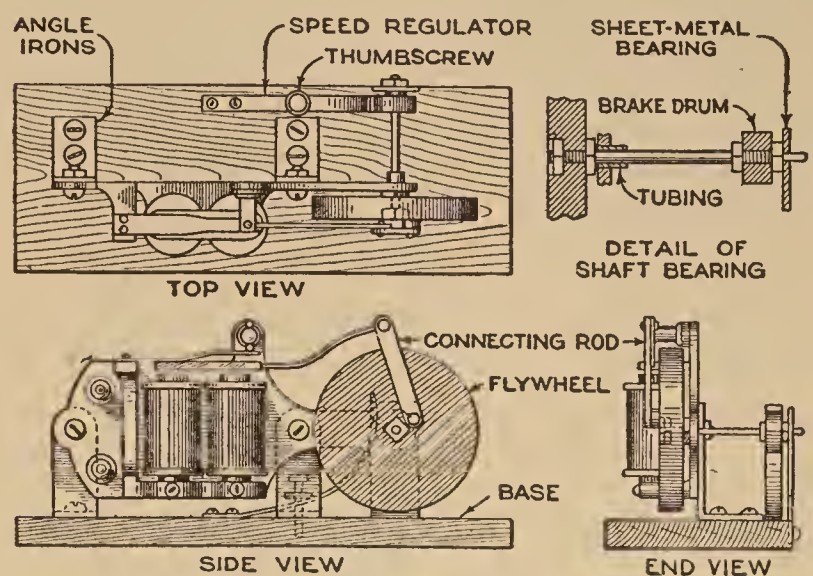


space for swinging a full-length ladder to the ceiling. The upper end of the steps, or ladder, is attached to the wall with hinges, as indicated. The side rails are sawed in two near the middle, the cut being made in a diagonal direction to af-

ford a longer bearing and to bring less strain upon the strap hinges by which the sections are joined. By means of a rope and pulley, the lower section is folded inward against the upper section when the steps are drawn up. The steps are held in the raised position by taking several turns of the rope around a cleat on the wall.—C. H. Patterson, Pomona, California.

Motor Made from Electric Bell

An entertaining and instructive electric motor can be made from an ordinary electric doorbell, and while it is not at all



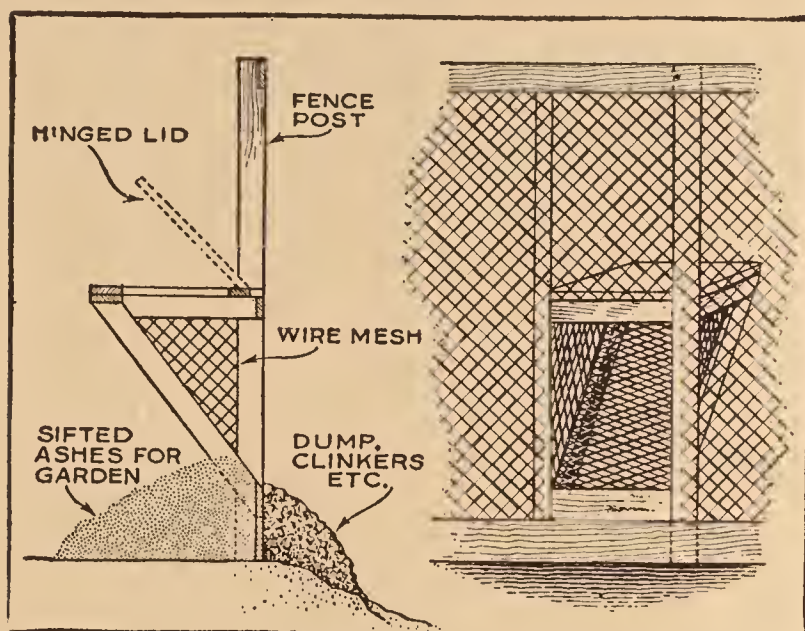
An Ordinary Electric Doorbell is Converted into an Entertaining and Instructive Electric Motor by Means of a Few Simple Alterations

powerful, it will run at high speed when properly adjusted. If possible, procure a bell with a wooden back, as such a back is easier to attach to the base. Set the bell on the base, edgewise, with the hammer, or tapper, up, and secure with screws through the base. If a wooden-backed bell is unobtainable, a bell with an iron frame may be attached to the base by using angle irons, as shown in the drawing. Remove the bell and bell post, and substitute a small piece of metal tubing where the post pierces the board; in the case of an iron-frame bell, a hole will first have to be drilled through the casting. Then cut out a wooden flywheel of about the same diameter as the bell, and run a piece of stiff steel wire through the center for a shaft; this wire should be of a size to fit easily in the tube. The other end of the shaft is supported by a sheet-metal bearing, fastened at the rear of the base and drilled with a hole, near the top, to accommodate the shaft. Rivet the end of the shaft slightly to prevent it from pulling out, or drill a hole through it and insert a pin, or piece of wire. Before setting the shaft in place, a brake drum made from a small spool, or disk of wood, is forced on in the position shown. Then arrange a strip of spring brass to the base, so that it will not quite press against the brake drum; a thumbscrew may be added for holding the spring against the drum, if desired. The hammer is next flattened on both sides, and a small hole is drilled through its center; this is then connected to a screw which is placed near the center of the flywheel by means of a sheet-metal connecting rod, as shown. Determine

how far the hammer will move when attracted by the magnets, and then place the screw just half this distance from the center of the wheel; it may be possible, by adjusting the tension of the spring, to obtain greater freedom of armature movement. Such a motor will operate on one or two dry cells, and will provide sufficient power to operate small mechanical toys.—L. B. Robbins, Harwich, Mass.

An Automatic Ash Sifter

The soil in some localities contains a great deal of clay, and the automatic ash



An Automatic Ash Sifter Which Deposits the Clinkers outside the Garden and Leaves the Sifted Ashes Inside for Application to Clayey Garden Soils

sifter shown in the drawing will prove of considerable help to gardeners in such places. It is built into a fence at the rear of the garden, and, as shown, consists of nothing more complicated than an inclined screen. In use, the ashes from the furnace are dumped into the opening inside the fence, and the fine ashes are automatically deposited in a pile underneath, while the clinkers and cinders are deposited outside.—Chester Disque, Covington, Ky.

Mystifying Transformation of Water into Ink and Wine

Seen by the audience, the magician exhibits a pitcher of water and drinks some of it to show it has not been "doctored." Eight empty water glasses are arranged on a board across two chairs. The magician pours water into the first glass and it remains water, but when water is poured into the second it turns inky black. The third glass will remain clear, and the fourth assumes the appearance of ink. The contents of the four glasses are poured into the pitcher and all has the as-

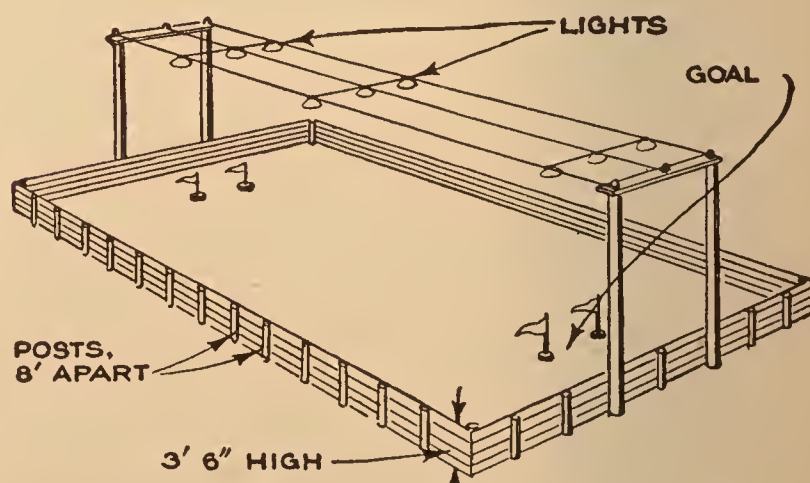
pect of ink. The magician then pours the "ink" into glasses 1, 2, 3, and 4. He pours the inky fluid into the fifth glass and it turns to water again. He pours all back into the pitcher and all is water. The first five glasses are filled with the water, but in the sixth it changes to the appearance of claret wine. The contents of all six glasses are poured back, and he has a pitcher of wine. The first six glasses are filled with the wine-colored fluid which turns to water when poured into the seventh glass. The liquid is again returned to the pitcher, and all is water again. All eight glasses are filled with water from the pitcher and no change occurs in any but the last, the water assuming the appearance of milk.

The preparation is simple. Glasses 1 and 3 are unprepared; glasses 2 and 4 contain 10 drops of a strong solution of ferric chloride; glass 5 contains 10 drops of a saturated solution of oxalic acid; glass 6 has 10 drops of ammonia; glass 7 holds 60 drops of sulphuric acid, the last glass contains a teaspoonful of tincture of resin, and the pitcher, a pinch of tannic acid. The chemicals are all poisonous and should be carefully handled.

The operation is also simple. Fill the first four glasses, pour them back; fill the first five, pour them back; fill the first six and return to the pitcher, and then fill all eight glasses.—Frederick C. Davis, St. Joseph, Mo.

Arrangement of Hockey Rink

A hockey rink that can be used for either day or night games is arranged as shown in the drawing. The inclosure is 140 by 80 ft., and a 3½-ft. fence is built around all four sides, the posts being set



Layout for a Hockey Rink That can be Used by Day or Night, Electric Lights being Provided for Night Play

about 8 ft. apart; these are either set into the ground or frozen solidly into the ice. The goals are 120 ft. apart, and each is illuminated by three electric

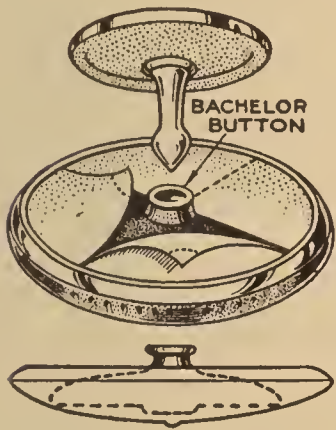
lamps, other lamps being provided as necessary to give sufficient illumination for night play.—C. L. Meller, Fargo, N. D.

Protecting Hardware When Painting

The handy man around the house cannot be expected to possess a journeyman's skill at every trade he turns his hand to, and this is particularly true of a home painting job, the difficulty consisting in applying the paint without running it over onto the hardware, such as locks, knobs, and hinges. Vaseline will enable the ambitious but unskilled painter to avoid this. A coating of vaseline is applied to the part it is desired to protect; when the paint has dried on the woodwork, the vaseline is removed with a cloth, and at the same time any paint that may have been inadvertently applied. —John T. Bartlett, Boulder, Colo.

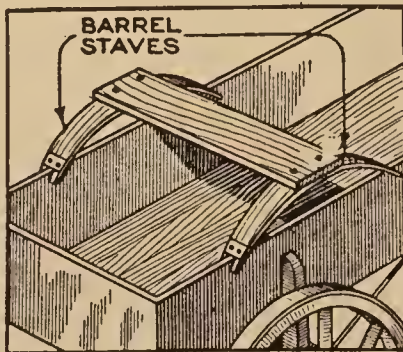
Repairing Uniform Buttons

Metal buttons such as are worn on the uniforms of firemen, members of train crews, and others, sometimes lose connection with the soldered eye, and the button is worthless. Such broken buttons are easily repaired and restored to usefulness. As shown in the drawing, the metal back is cut into four segments, which are turned back to permit the insertion of an ordinary "bachelor" button. The metal flaps are turned down and the button is affixed to the coat in the same manner as the bachelor button.—A. Peltier, Edmonton, Alta.



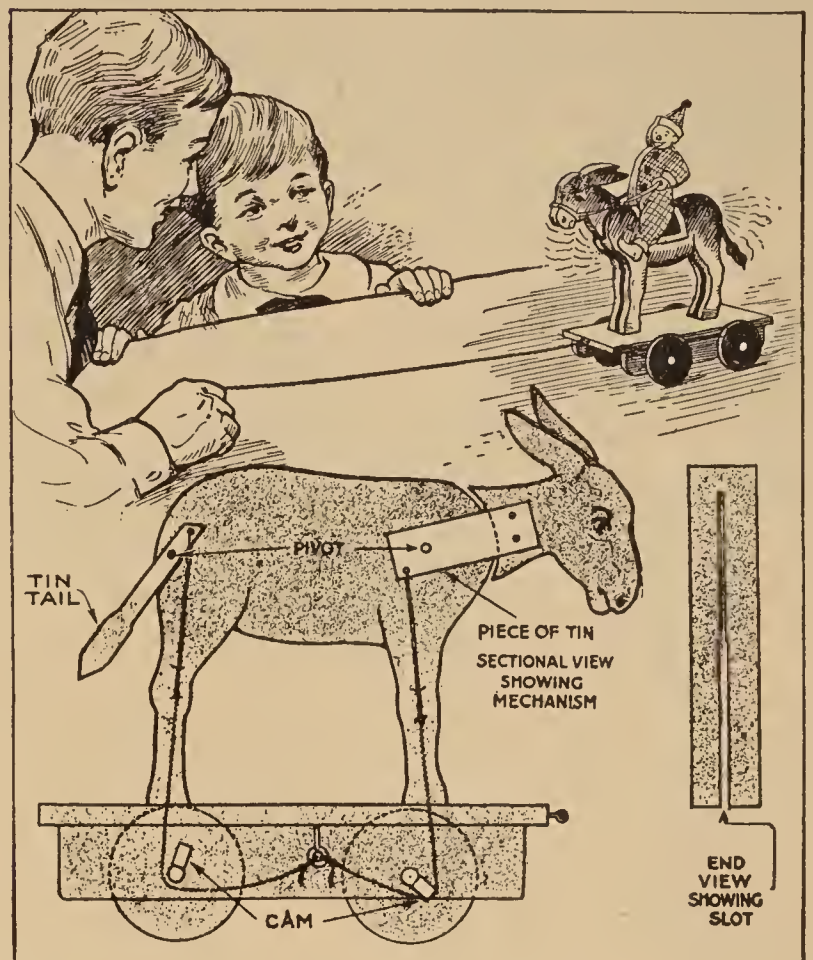
Wagon Seat Made of Barrel Staves

A comfortable wagon-box seat can be made from a wide plank and two stout barrel staves, as shown in the drawing. The plank, which forms the seat, should be about 2 in. longer than the width of the box, and is secured to the two staves, as shown. Notches in the ends of the staves, strengthened by lateral braces, serve to hold the seat securely to the box.



Toy Donkey Nods and Wags Its Tail

The most popular toys are those that move in imitation of some well-known



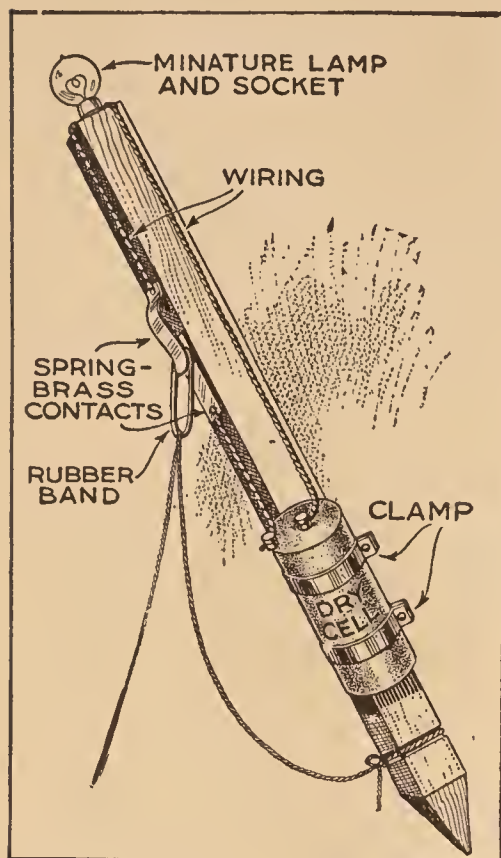
A Toy Donkey That Wags Its Tail and Nods Its Head, When Drawn across a Table, Has a Simple Mechanism That Makes It Easy to Construct

object, and the donkey, shown in the drawing, that wags its tail and nods its head, is a good example of these. The outline is drawn on a $\frac{3}{4}$ -in. block and sawed out with a scroll, band, or coping saw, and the head is sawed off, as indicated. A slot is then sawed up through the legs and part way into the body. A similar, but narrower, slot is cut in the back of the head, and a strip of tin is used to connect the head to the body, as shown. A piece of tin, cut to the shape of a tail, is similarly attached in the slot behind; both the tail and the tin strip which connects the head to the body are pivoted to the latter with small brads. Motion to the head and tail is imparted by wires which connect the parts to a screw eye underneath the wheeled base on which the figure is mounted. Flat strips of wood with rounded edges, which are attached to the revolving axles, strike the wires as the toy is pulled across a table and cause both head and tail to move up and down. The animal may be decorated as desired.

Grinding two pieces of smooth glass together, using fine valve-grinding compound, will make a good grade of ground glass.

Alarm for Ice Fishing at Night

Fishing through holes in the ice, at night, when ordinary signal flags or tip-ups are invisible, is possible with the electrically illuminated device illustrated.

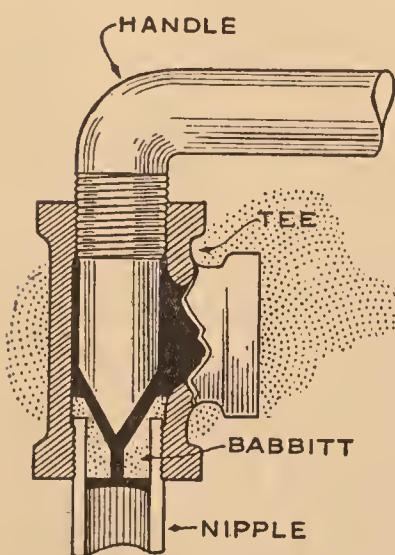


As shown, a round stick of the desired length has a miniature lamp and socket attached to the outer end, and this is connected to a dry cell, which is clamped near the lower, pointed end.

Spring-brass contacts are secured to the stick with screws, as shown. In use, the device is propped over a hole in the ice; the line is set to pass through a rubber band which separates the contacts, but as soon as a fish takes the hook the band is pulled out from between the contacts, and the lamp is lighted.

Needle Valve Built in Pipe Tee

Not being able to obtain a needle valve of the size desired, a young mechanic turned out a satisfactory substitute from a standard pipe tee. A short nipple, provided with a loosely fitting wooden plug, was screwed into the tee, which was filled with melted babbitt to the point desired. The plug was then removed from the nipple and a center hole of the proper size was drilled. Using this hole as a center, the tapered needle seat was drilled out with a 60° countersink. The needle consists of a piece of iron rod sharpened to a point and threaded to fit the tee. The rod is bent at an angle to form a handle.—F. B. Pinkus, Pasadena, California.



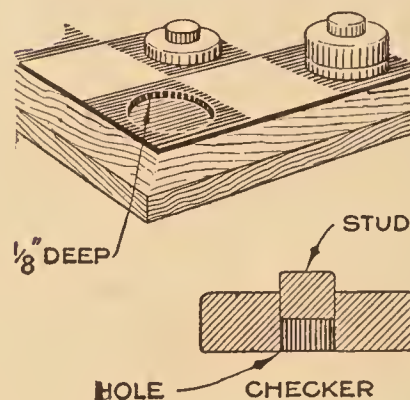
Sewing Machine Perforates Wallpaper

Wallpaper borders are very often not perforated sufficiently to obviate danger of tearing, and in some cases are not perforated at all. By running the border through a sewing machine, of course without any thread in the needle, the perforation may be successfully performed. A heavy needle should be used, and may be broken off just above the eye, and repointed, to provide additional strength. This method may be used for any purpose in which perforated paper is required.

Checkerboard and Checkers

The principal fault of the ever popular game of checkers, or "drafts," is the ease with which the pieces become disarranged on the board, but with the checkers and board arranged as in the drawing this trouble is removed.

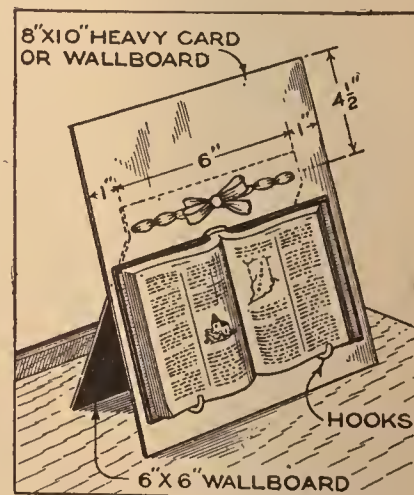
One-eighth-inch deep holes, of the same diameter as the checkers, are drilled on the black squares of the board. The checkers themselves are made with a small projection, or stud, on the upper surface. Ordinary checkers may be



altered by drilling a hole through their centers and inserting a short dowel, leaving a depression in the bottom of the piece to accommodate the stud of the bottom checker when a "king" is made.

Homemade Book Rests

To encourage a proper sitting posture, the authorities of a western school furnished inexpensive material which was made into book rests by the pupils themselves. These rests were made from two pieces of stiff card or wallboard, the pieces being held together with ribbons. Strong wire hooks, inserted through the rest, serve to hold the book in an open position. The completed rests were decorated with original designs by the pupils.

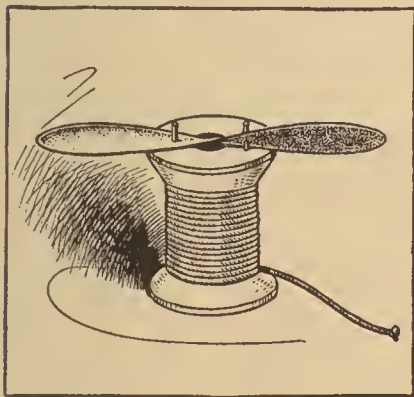


Leaf Impressions in Natural Colors

Fine impressions of leaves from trees, or other plants, in natural colors can be obtained by a simple process. A leaf is placed on a sheet of paper, and covered with a piece of linen cloth that has been soaked in spirits of niter. Another sheet of paper is placed on the linen, and a heavy book on top of that. About a day is required to transfer the coloring matter in the leaf to the paper underneath. To heighten the colors, a little varnish is brushed over the print. Note paper and menu cards can be decorated in this manner. The process can be used with either green or frost-colored leaves.—S. Leonard Bastin, Bournemouth, England.

A Simple Aerial Toy

An interesting little toy that involves no more than a small piece of tin and an empty thread spool can be made in a few minutes. Two small wire brads are driven into one end of the spool, at diametrically opposite points, and the heads are clipped off, leaving studs, $\frac{3}{4}$ in. long. A "whirler" is made from a piece of tin in the form of an airplane propeller, the blades being bent in opposite directions, as indicated.



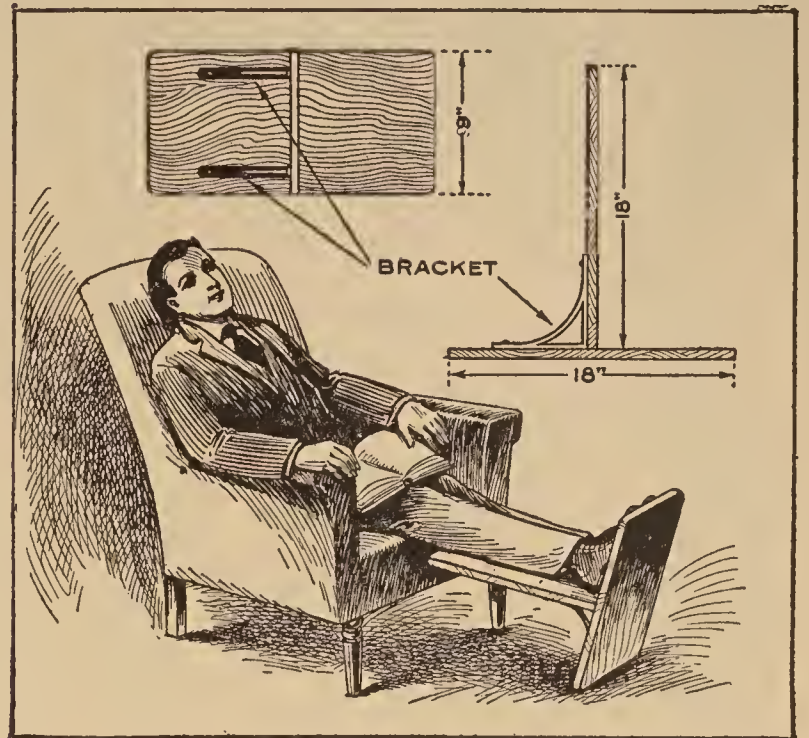
Holes to permit the propeller to make an easy fit on the studs are provided at the proper points. In use, the spool is placed on a shouldered stick, slightly smaller than the hole of the spool; then about 4 ft. of strong twine is wrapped around the spool and the propeller is placed on the studs. Holding the spool by its shaft, in one hand, the string is given a sharp pull, and the propeller flies off into space.—Floyd W. Sanders, Thomasboro, Ill.

Old Cans Prolong Stovepipe's Life

A rather novel utilization of old tin cans consists in using them for stovepipe linings to prolong the life of the latter. The tops and bottoms of the cans are removed by heating, and the seam at the side is opened up, retaining the original curvature; the cans are slipped inside the stovepipe and serve to protect it from the action of the heat and gases passing through it.—Thos. W. Benson, Philadelphia, Pa.

Easily Made Footrest

A comfortable and easily made footrest is made from two pieces of $\frac{3}{4}$ -in. board

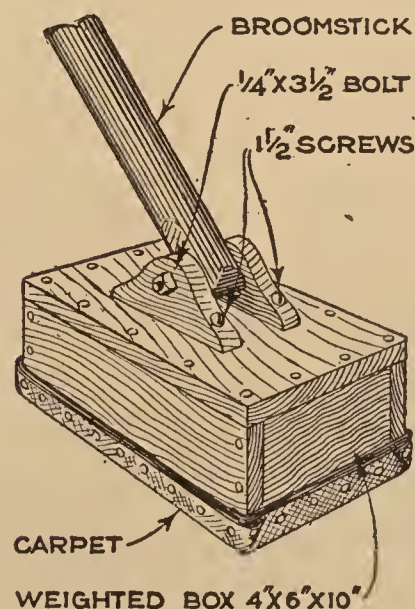


No Effort is Required to Hold This Easily Made Footrest in Position. Two Boards and a Pair of Metal Shelf Brackets Are the Materials Required

and a pair of metal shelf brackets. The two boards, each 9 by 18 in., are screwed together at right angles to each other, and the shelf brackets are attached underneath, to strengthen the construction. All corners of the boards are rounded off smoothly, and the whole is given a coat of paint, varnish, or stain, as desired. The footrest is used as shown in the drawing, and no effort is required to hold it in position.—E. Nesbitt, Quebec, Can.

A Homemade Floor Polisher

A weighted polisher for finishing hardwood floors can be made with little difficulty as indicated by the drawing. A box,

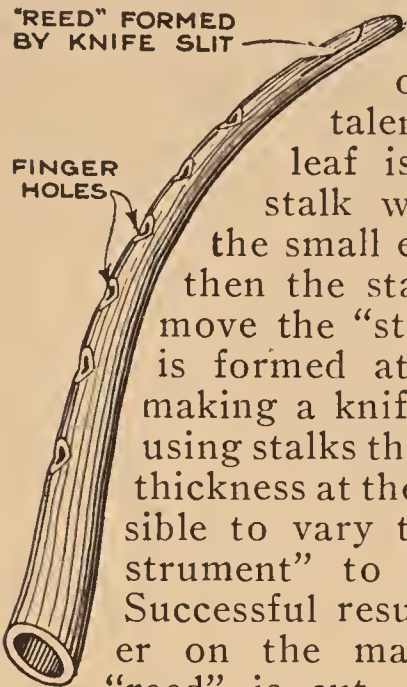


large enough to hold one or two bricks, is made from 1-in. lumber. The inside of the box may be filled with melted lead, if available. The handle is held to the top by means of wooden brackets and a bolt which passes at right angles through the lower end of the handle.

The polishing surface is formed by folding several thicknesses of old carpet over the face and tacking the edges to the sides, as shown.

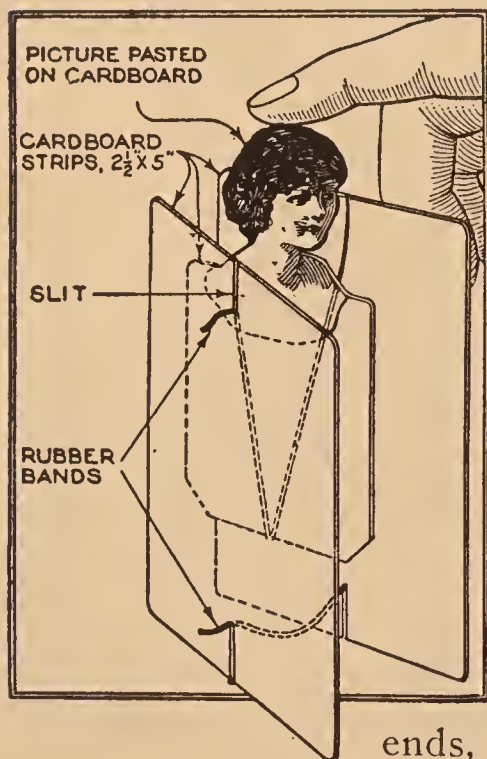
Getting Music from Pumpkin Stalks

Hollow leafstalks of pumpkin vines can be made into musical instruments, the quality of the music depending, of course upon the talent of the user. The leaf is stripped from the stalk without breaking off the small end, which is closed; then the stalk is scraped to remove the "stickers" and a "reed" is formed at the upper end by making a knife slit, as shown. By using stalks that vary in length and thickness at the large end, it is possible to vary the tone of the "instrument" to almost any degree. Successful results depend altogether on the manner in which the "reed" is cut. Some practice will perhaps be required before the knack of doing this is acquired. Finger holes are also cut into the stalk, as shown. In use the instrument is played in the same manner as a clarinet, or any other reed instrument.



Jumping Toys from Magazine Pictures

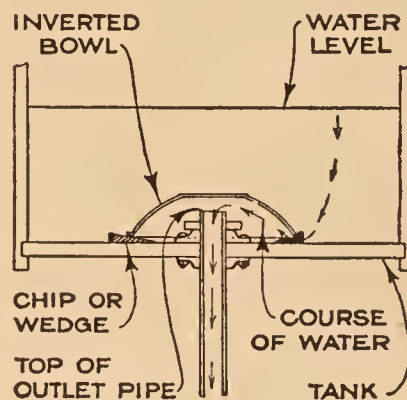
Jumping jacks without boxes that will provide endless entertainment for the juvenile members of the household can be made from no more elaborate materials than a few strips of pasteboard and some rubber bands. Three strips of stiff cardboard, uniform in size, are required to make one of the toys. Two of the strips are placed together, and slits, about $\frac{1}{2}$ in. deep, are cut in both ends, as shown in the drawing. Two long rubber bands are required; these are cut open at one end, and the ends are inserted in the slits of the opposite cards, as shown. Only one rubber band is used at a time, the other one being provided for use in case the first breaks, when the toy can be turned upside down and used without interruption. The third card has a



suitable picture pasted at one end, and the cardboard is cut away around the edges of the picture. Hold the toy in the hand and insert the strip containing the picture at the top; press down against the rubber band in the manner indicated. When the pressure of the hand is relieved, the tension of the rubber band against the bottom of the picture causes it to jump out above the upper edge of the strips.—E. K. Wehry, Cedar Rapids, Ia.

Bowl Siphon for Draining Tank

When a large tank was to be drained, it was found that about 6 in. of water, which was below the level of the outlet pipe, could not be drawn off, and that mopping up this water would be tedious and expensive. However, by the application of the siphon principle, shown in the drawing, all but a very little of the water was drained out of the tank.



Three wedge-shaped pieces of metal were laid on the bottom of the tank, at equal distances around the outlet pipe; then about 2 ft. of water was run into the tank, and an ordinary washbowl was inverted over the outlet pipe. The rim of the bowl was supported, about $\frac{1}{2}$ in. above the tank bottom, by the wedges on which the rim rested, and, as the only outlet was underneath the rim of the bowl, the water was compelled to run to the lowest point, and then rise and pass through the outlet; this created a partial vacuum under the bowl and siphoned off all but about $\frac{1}{2}$ in. of water, which was easily mopped up.

Making Nicotine Spraying Solution

As concentrated nicotine solutions are not always available to the gardener, and plug tobacco usually is, the latter can be used for making an effective spray for combating aphids, radish maggot, and other insect pests.

An ordinary "plug," costing about 10 cents, is steeped in several waters until its strength has been fully extracted. To the liquid obtained, water is added to make 10 gal., and this solution is used as a spray. For radish maggot and similar subterranean insects, the earth around the infested plants is saturated with the solution.

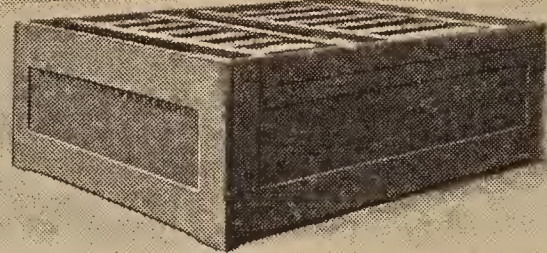
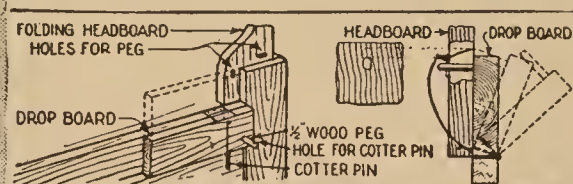
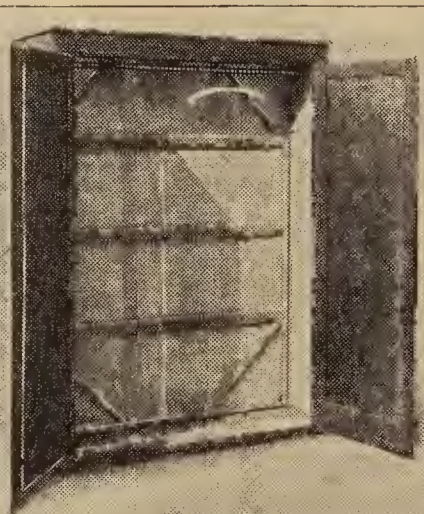
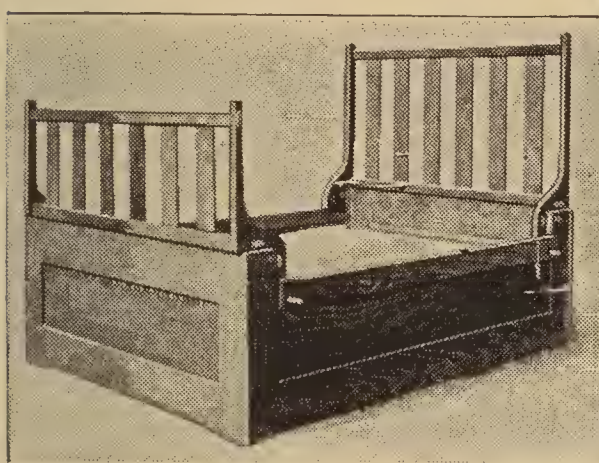


Combination Bed and Wardrobe

BY J. M. SNAVELY

A COMBINATION of bed and wardrobe is shown in the photographs. The making of such a combination requires the construc-

of these boards will be described later. The end uprights and horizontal cross-pieces of both head and footboards are made from $\frac{7}{8}$ -in.



An Ingenious Cabinetmaker Is Responsible for This Combination Bed and Wardrobe. The Photograph at the Left Shows Everything Ready for Making Up a Comfortable Bed. The Central Picture Gives an Idea of Its Appearance When Used as a Wardrobe; the Picture at the Right Shows the Manner in Which the Head and Footboards Fold into the Cabinet

tion of a substantial, though light, wooden cabinet and, as such a cabinet must be built to fit the bedspring to be used in connection with it, no definite dimensions can be given. The cabinet shown has a depth of 2 ft. The framework and doors are made of $\frac{7}{8}$ -in. material, joined together at the corners with glue and screws. The panels are $\frac{3}{8}$ in. thick. Thirteen inches is allowed for the depth of the wardrobe section, which is separated from the bed section by a light partition that supports the bed. Strips are attached to each of the four sides and secured to these are the horizontal slats and corner braces shown in the central photograph; all of these pieces are also of $\frac{7}{8}$ -in. material. In order to conceal the bed when the doors are opened, this partition is covered with wallboard. The wardrobe doors are held in place by bolts at top and bottom, which are connected to the knob at the center by rods in such a manner that a half turn of the knob locks or unlocks the doors. Arrangements for hanging the clothing complete the wardrobe section.

Hinged drop boards are provided on each side, being made of the same material as the cabinet frame and attached to it with three butt hinges; the purpose

material, while the upright slats are $\frac{3}{8}$ -in. thick. The endpieces of both head and footboards are made sufficiently long, so that they may be attached inside the frame with long screws. The point of attachment is quite important, as it is desirable that the bottom bars of the head and footboards should rest upon the edge of the cabinet frame, as shown in the photograph at the left, when raised; also, when lowered, the head and footboards should come flush with the edges of the cabinet, as shown in the photograph at the right.

The hinged drop boards already referred to, are provided with stout pins at each inside end, as shown in the detail drawing at the right. When the head and footboards are lowered, these pins fit into holes drilled into the endpieces, and hold them securely when the cabinet is stood on its end during the day for use as a wardrobe. In addition to securing the head and footboards, the bedclothing and springs are also held in place.

¶An extra dry cell or two can be carried along inside the spare tire, in case of emergency; these may be connected to the taillight when the charge in the storage battery runs low.

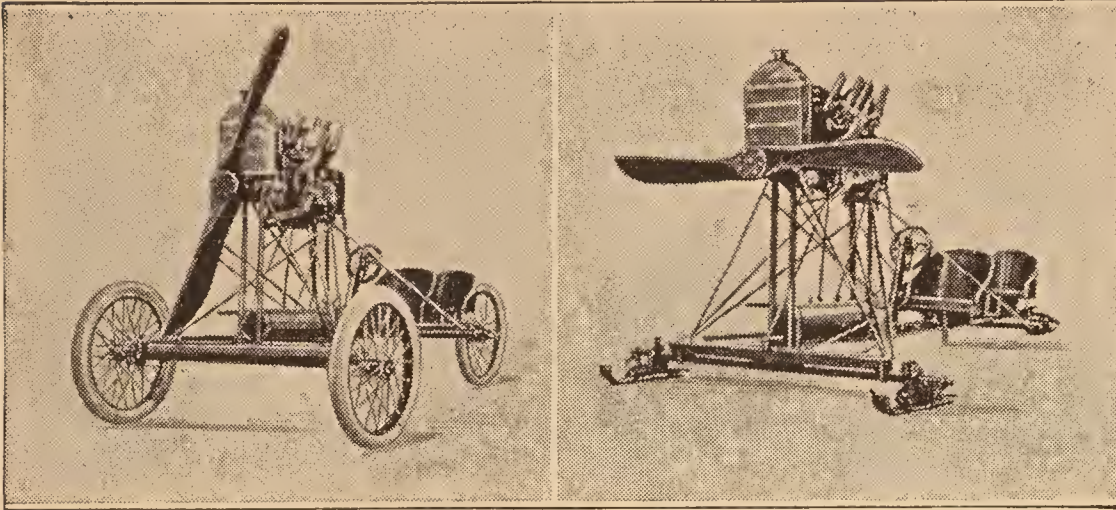
Wind Wagon Convertible to Ice Boat

A wind wagon, propelled by an airplane propeller, can be used at all seasons of the year if equipped as shown.

Most of the parts involved in the construction of the vehicle, such as the fuel tank, engine, front axle, radiator, and a few other parts, were taken bodily from

a light automobile. The engine and bucket seats are attached to a strong wooden beam, running at right angles to the front axle, provision being made at the outer extremity for the attachment of a single wheel. The engine is mounted on a strong tubular-steel frame, which is suitably braced, so as to provide ample clearance for the 5-ft. propeller. A steering wheel

in front of the driver is connected to the steering knuckles on the front axle by flexible steel cables, which are attached to a drum on the steering wheel somewhat after the fashion of the steering apparatus of a motorboat. In summertime, or, as desired, the vehicle is equipped with three pneumatic-tired wheels, but for use in winter, or on the ice, the wheels are removed and replaced by runners.



A Wind Wagon Built for Year-Round Service: The Pneumatic-Tired Wheels Shown in the Photograph at the Left are Removed and Substituted by Runners for Use in Winter

Paper Cubes That "Blow Up"

Paper cubes, or boxes, that will provide considerable amusement for the children,

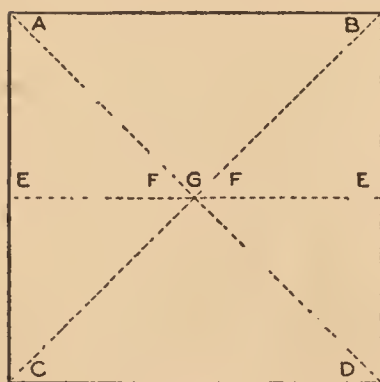


FIG. 1

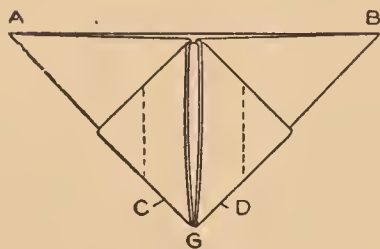


FIG. 4

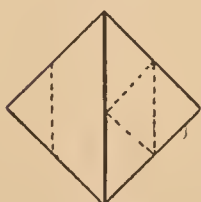


FIG. 5

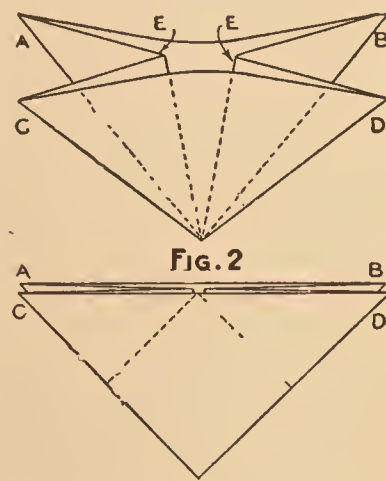


FIG. 2



FIG. 6

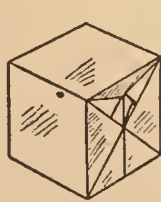


FIG. 7

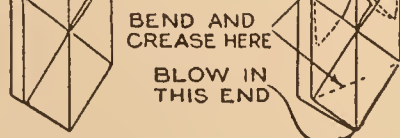


FIG. 8: COMPLETED CUBE

Paper Cubes, or Boxes, That "Blow Up," are Easily Made from Square Pieces of Paper. The Illustration Shows the Various Steps in Construction

are easily made. A square piece of paper is folded, as shown by the dotted lines in Fig. 1, from points A to D and from B

to C. The paper is spread out and folded on the opposite side from points E to F. The square of paper is again spread out and folded into the form shown in Figs. 2 and 3. The corners A, B, C, and D are folded on the dotted lines shown in Fig. 3, to the center G in Fig. 4. When all four corners have been folded, the paper will appear as shown in Fig. 5. The four corners are folded toward the center, as indicated by the dotted lines in Fig. 5. When this is done the paper will appear as in Fig. 6. The corners A, B, C, and D are bent on the dotted lines in Fig. 6 and folded inside the flap, as in Fig. 7. When the paper has been folded into the form shown in Fig. 7, a hole will be left at one end, and the cube, or box, is expanded by blowing into it. The inflated cube is shown in Fig. 8.—D. George Logan, Jr., Pittsburgh, Pa.

Plumb Bob Indicates Position of Car

Various devices, such as marks on the wall and floor, are used, in garages of limited space, to indicate where the car should be stopped in order to get the proper clearance for closing the doors. A very convenient arrangement for this purpose is a plumb bob, which can be made from any small, heavy object, suspended from the ceiling by a string or wire. The plumb bob is hung in such a position that when it is touching the radiator, or the

radiator-filler cap, the car will be properly spotted. The bob is always visible and never in the way.—A. Swanson, Okmulgee, Okla.

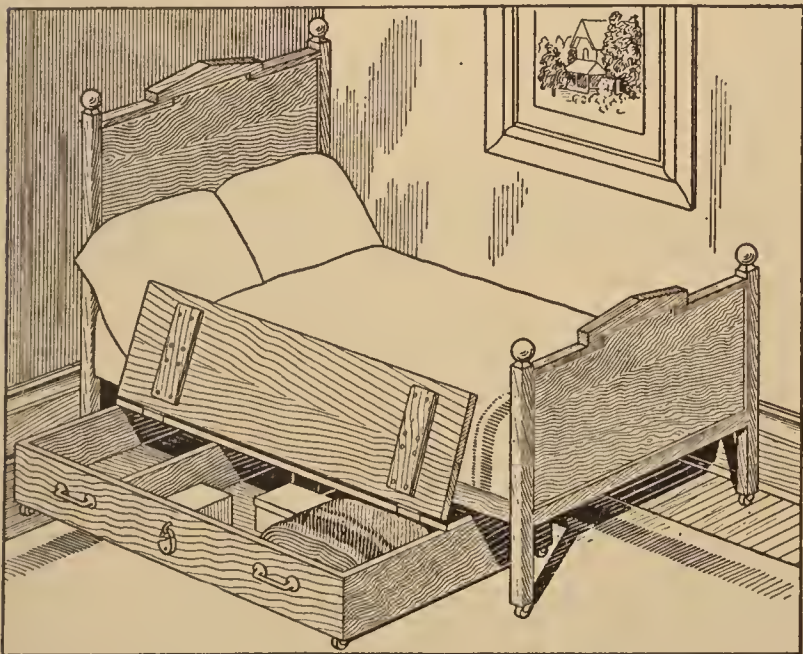
Making Bubbles Carry Paper Figures

To make soap bubbles that will carry small paper figures is an interesting pastime. A solution made of soap shavings and water, with glycerin in the proportion of one-third, is used. The solution is placed in a bottle and shaken up until the soap has dissolved, and is allowed to stand until it settles, the clear liquid at the top being used for blowing the bubbles.

The figures are cut from tissue paper and a short piece of thread is attached through the top. The other end of the thread is knotted through a disk of very thin paper. It is best to blow the bubble through a glass tube, and when a bubble of the desired size has been formed, place the paper disk on one side; this will at once slip to the bottom. Shake the bubble off and it starts on its aerial journey carrying the paper figure.—S. Leonard Bastin, Bournemouth, Eng.

Clothes Chest for the Small Apartment

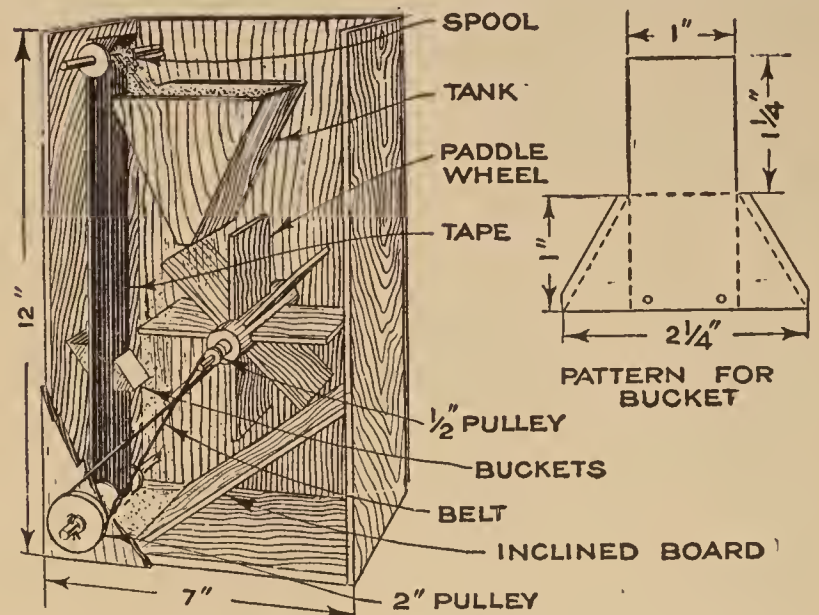
Modern apartments are characterized by a minimum of storage space, and the drawing shows how one of our present-day cliff dwellers solved the storage problem by utilizing the space underneath the bed. A light wooden box, mounted on ball-bearing casters, and provided with a cover hinged at the center, to protect the contents, was made as shown in the drawing. When not in use the box remains concealed underneath the bed.—Roscoe P. Guilbert, Racine, Wis.



A Clothes Chest, Which Pulls from Beneath the Bed at a Touch, Helps to Overcome Scarcity of Storage Space

A Toy Sand Motor

A sand motor that will operate toy machinery, and cost nothing to operate, will



A Toy Motor, That is Operated by the Weight of Sand Falling on the Blades of a Paddle Wheel: This Motor will Run for Upward of Half an Hour without Stopping

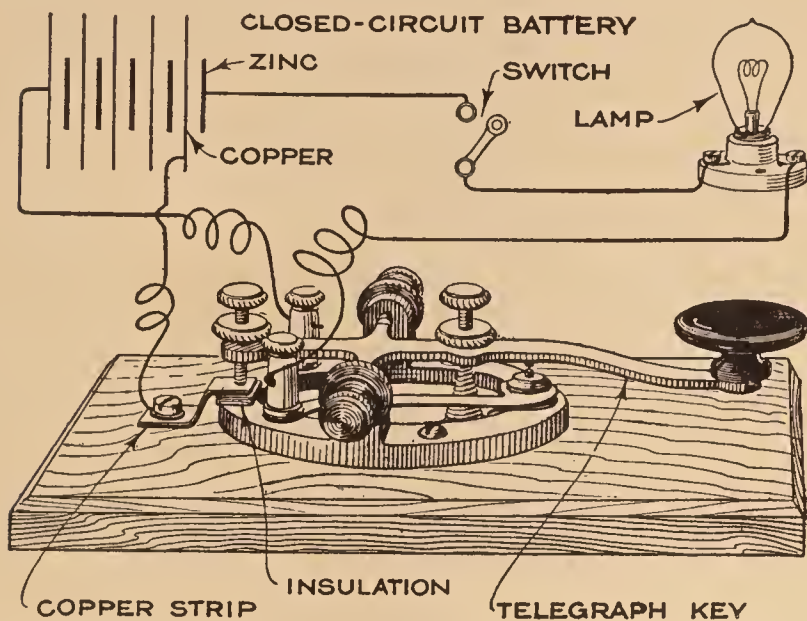
interest any child, particularly when the motor will run continuously for a half hour without stopping. As shown in the drawing, the parts of the motor are simple, and consist of an elevated reservoir containing sand arranged so that a stream of sand running through an opening in the bottom operates the paddle wheel immediately below. An inclined board, underneath the wheel, piles up the sand in the corner so that it can be scooped up by the bucket conveyor and returned to the sand bin. The bucket conveyor consists of three small scoops made from tin, according to the pattern shown, and sewed to a piece of tape. The size of the pulley on the conveyor shaft should be about four times that of the one on the end of the paddle-wheel shaft. Both pulleys are connected with a string belt. With the exception of the conveyor and buckets, the whole machine can be made from cigar boxes, spools, and glue.—Wayne Leyrer, Atlantic City, N. J.

Place Cards Made from Nuts

Odd little baskets that may be put to a variety of uses can be made from various nuts and seeds by cutting a segment from each side with a pocketknife, or a fine metal-cutting saw, leaving a strip of shell to form a handle. The kernel and fiber are then scooped out. Such baskets can be used for watch charms or, by attaching them to a card with a drop of glue and filling the basket with a small souvenir, they form attractive place cards.—Cora Hamilton, Binghamton, N. Y.

Improved Telegraph Blinker

The least expensive method of communicating at night, between points within sight of each other, is by blinker tele-



By Means of the Apparatus Illustrated, an Almost Instantaneous Lighting Effect is Obtained, Enabling Signals to be Rapidly Sent

graph; a system whereby a miniature electric lamp, mounted on a housetop, tree, or other elevated location, is "blinked," in dots and dashes, by an ordinary telegraph key in the house, or from any position where the operator may keep the light of the distant station in view. Lamps may be bought for a few cents that will not require more than four or five cells to light them. Light in an electric lamp is caused by the current passing through the lamp filament with a little more force behind it than the filament is capable of handling with ease. Naturally, it takes a little time for the current to heat up the filament, as well as for the light to completely disappear after the current ceases to flow. Should the lamp be connected directly in series with the key and battery the signals must be slow, to allow time for the filament to heat sufficiently to make a light. If, however, a single cell is always kept in series when the key is open, the lamp filament will be kept partly heated, although not enough to make a light. This arrangement allows almost instantaneous lighting when the full power of the battery is turned on by depressing the key, and greatly increases the speed of signaling.

As shown in the drawing, an ordinary telegraph key is used, but a back contact, which consists of a strip of copper, bent to the shape shown, is necessary; this contact is insulated from the key and screwed to the instrument base, as indicated. A wire from the back contact is connected to the copper electrode of a

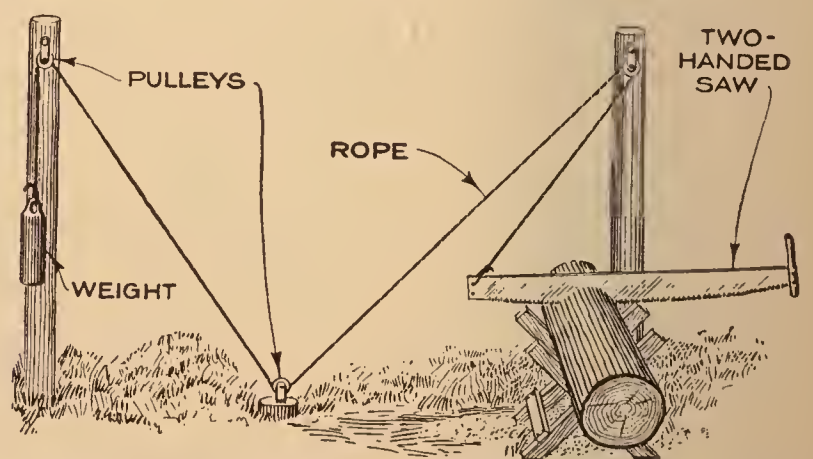
single cell, as shown. When at rest, the key is resting upon the back contact, which allows a relatively weak current from the one cell to flow through the key lever to the lamp and thence back to the cell. When the key is depressed, to make a signal, the back contact is broken and the united strength of the whole battery flows through the lamp, causing it to light.

Closed-circuit, or gravity, cells should be used in this hook-up, and the end cell interchanged with one of the others, at intervals, so that it will not be overworked. Perhaps the best battery for the purpose, and the easiest obtainable, is the familiar "crowfoot," with zinc and copper electrodes immersed in a solution of blue vitriol and water. A switch may be inserted in the circuit, between the lamp and the first cell, so that the latter may rest when the apparatus is not in use.—Samuel W. Beach, Washington, D. C.

Device Enables Crosscut Saw to be Used by One Man

A device which enables one man to use a crosscut saw is shown in the illustration. Two posts are driven into the ground about 6 ft. apart. Near the top of each of these is fastened a pulley, and midway between the posts is fastened another pulley, as shown. A sawhorse is placed beside one of the posts, the handle removed from one end of the saw, and the end of a rope passed through one of the bolt holes and tied.

The other end is passed over the pulley on the first post, under the center pulley,



A Two-Handed Crosscut Saw is Easily Handled by One Man If This Rigging is Used

over the pulley on the other post, and a heavy counterweight is then fastened to it. With this arrangement, the saw may be easily handled by one man.

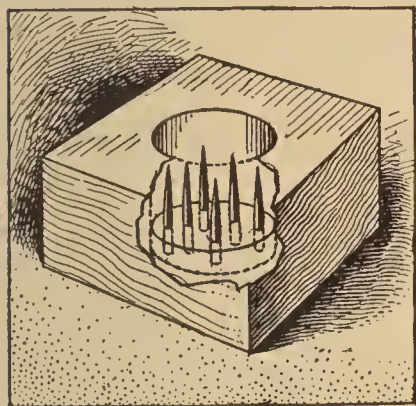
❏ Cedar-pencil shavings, from pencil sharpeners, put into small bags and packed away with clothing, will prevent the inroads of moths.

Tightening a Cane Chair Seat

After a period of use the seats of cane-bottomed chairs begin to sag down in the middle. Such seats can be tightened by sponging the cane bottom with very hot water. The hot-water treatment is continued until the cane is thoroughly soaked; then the chair is set outdoors, in the sun if possible, or in a place where there is a strong draft, as the faster the cane is dried, the greater will be the shrinkage. Naturally, this method cannot be used without more or less damage to the finish of the article, unless the cane surface is unfinished.

A Simple Cigar Perforator

Instead of clipping, or biting, the end off the cigar, and thereby shortening the length of the smoke, the end can be perforated. The perforator shown in the



drawing consists of a small wooden block and several phonograph needles. A $\frac{5}{8}$ -in. hole is drilled partly through the block, and several needles are driven through from the bottom. The end of the cigar is in-

serted into the hole and pushed against the needles, which perforate the wrapper and allow the smoke to pass. This device is very desirable when used with cigars that are made with a short filler.

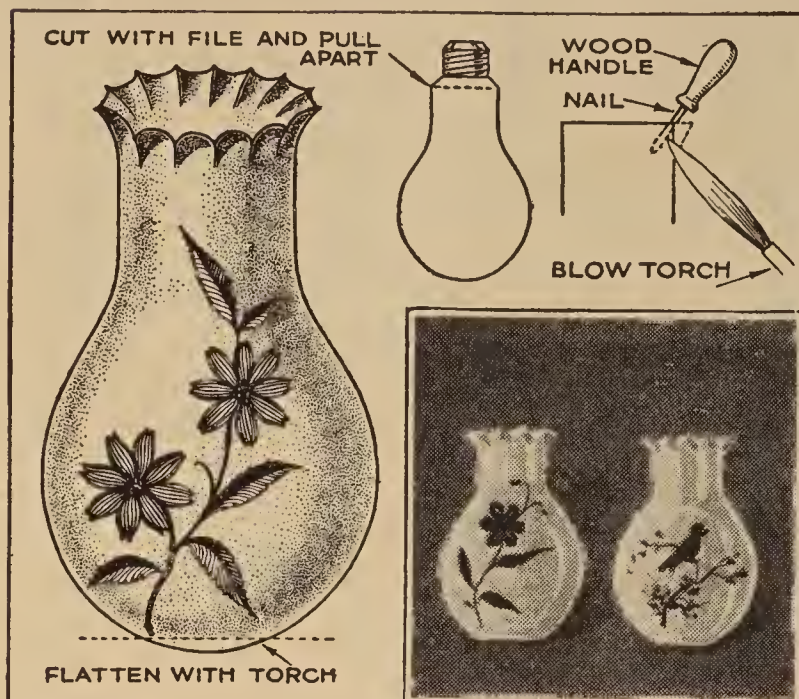
Printing from Cracked Negatives

To make a good print from cracked glass negatives, if the film remains unbroken, is not impossible, if some form of printing-out paper is used. Fasten a string to each corner of the printing frame and tie the loose ends together, a foot or so above the frame. The printing frame is suspended from a nail or hook, and the cords are twisted together, so that the weight of the frame will untwist them and revolve the frame. The secret of it is that the light is evenly distributed over every part of the revolving printing negative, instead of coming from only one direction as when printing from an uncracked negative.

☐ Kerosene oil, to which a few drops of ammonia are added, makes a good cleaner for Russian iron.

Light Globes Make Ornamental Vases

From one of the new milk-white electric-lamp bulbs attractive little flower



Ornamental Vases of Pleasing Size and in a Variety of Designs are Easily Made from Electric-Light Bulbs

vases are easily made. The neck of the bulb is scratched with a file, or glass cutter, and the brass tip removed by gently tapping it. The flame from a gas blowtorch is directed against the neck of the globe until the glass is red-hot, when the edge is formed into any of a variety of shapes by a forming tool made by driving a nail into a wooden handle and cutting off the head, as shown. After the edge has been formed, and the glass has been allowed to cool slowly, the flame is directed against the rounded bottom which is flattened after the glass becomes sufficiently heated. The resulting vases are ornamented as desired with oil paints.—Andrew Warmuth, Woodhaven, N. Y.

Garden Hose Makes Window Squeegee

An old broom handle and a piece of garden hose can be made into a squeegee, for scraping the water from windows

without the necessity of wiping the glass with cloths, or for scraping water and slush from sidewalks. A piece of the broom handle is cut to a semicircular section and covered with a piece of garden hose which



has been split in half and tacked to the wood. A suitable handle, as shown in the drawing, completes the tool.

An Efficient Ice Scraper

Where a heavy crust has formed on snow, or on ice-covered walks, the scraper



shown in the illustration will prove to be more easily operated than the snow shovel. It consists of a broken automobile leaf spring, fastened to a handle by means of a spring clip. The handle may be taken from an old spade or shovel, and cut to any convenient

For Cleaning Walks of Crusted Snow and Ice, this Simply Constructed Scraper Is More Efficient than the Shovel

length, and the rounded end of the spring should be the scraping point.

The blade, due to its narrow cutting face, and to its weight and length, will drive to a considerable distance under the crusted snow or ice, cleaving it loose in slabs, where a snow shovel would merely glide over the surface.—Judson DeGraff, Harrisville, N. Y.

Fuel Made from Balls of Paper Pulp

A good fuel can be made by pulping old newspapers and forming the pulp into balls. A tub, or other large receptacle, is filled with the papers and they are covered with water. If there is any tendency of the papers to float, a few stones will hold them under water. It is well to stand the container in the sun, as this will assist in reducing the material to pulp. The paper should always be kept covered with water; after three or four

days it will be soft enough to form into balls about the size of both fists. The balls should be squeezed hard to extract as much of the water as possible, and the completed balls then set aside to dry. When all the moisture has evaporated, they will be almost as hard as wood and can be stored away for winter use.

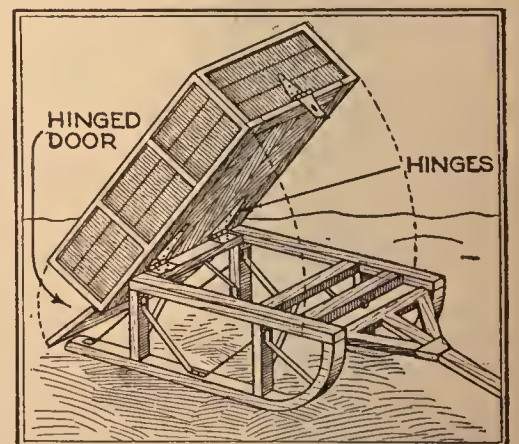
Hints on Varnishing the Car

The average automobile owner, who uses his car every day, hesitates to lay up his machine for the period necessary to revarnish it. As a short cut to a serviceable job, the car is thoroughly washed at the end of a day's run, and the body is gone over with waste, soaked in turpentine, to remove any adhering wax or body polish. Then the car is gone over with a polish, composed of $\frac{1}{2}$ pt. linseed oil, one-third as much turpentine, and a tablespoonful of drier. The car is then driven in this condition for two days, inasmuch as this treatment does not detract from its appearance, resembling only a body polish. At the end of the second day, the oil is hard and in good condition to serve as the foundation for holding a coat of varnish. Use only the best grade of varnish, diluted with half turpentine, and a small quantity of drier. If the varnish is applied in the evening, the car will be dry enough to drive on the following morning, without fear of picking up dust; if desired, a second coat may be applied two days later. If no second coat is to be applied, the varnish coat is rubbed down with finely powdered pumice and linseed oil, after the varnish has been allowed to dry on the car for at least three days.

Dumping Attachment for Box Sled

A dump sled for hauling manure, earth, and other bulk substances in the winter-time, can be built on a set of runners, as shown in the drawing. The dump body is attached to

the runners with hinges, just a trifle back of the center of gravity, so that the body can be easily raised to the position shown. A hasp and staple, attached to the body and runners respectively, holds the former in a hori-



respectively, holds the former in a hori-

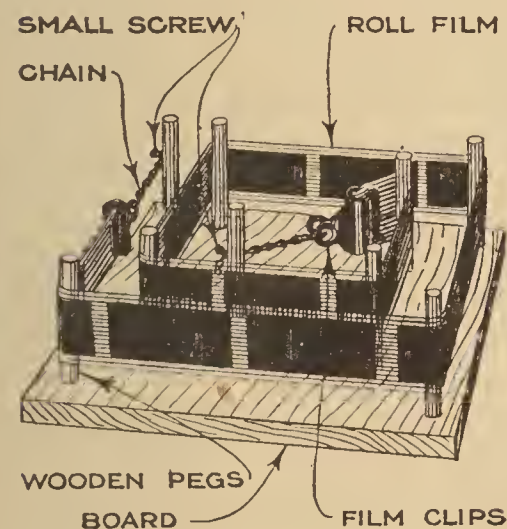
zontal position until the load is to be emptied.—J. G. Allshouse, Vandergrift, Pennsylvania.

Organ Stool as Child's High Chair

An organ or piano stool makes a convenient table seat for the child who has outgrown his high chair and is yet too small to use one of the regular chairs. The seat is removed from the stool, and in its place the back and seat of an ordinary chair are substituted; this arrangement makes a chair that with little effort can be adjusted to the height of its occupant.

A Roll-Film Washer

The washing of roll films presents many difficulties, unless special apparatus is used, and for this purpose the washer shown in the drawing fills the bill to a nicety; it consists of a wooden base fitted with vertical wooden pegs, around which

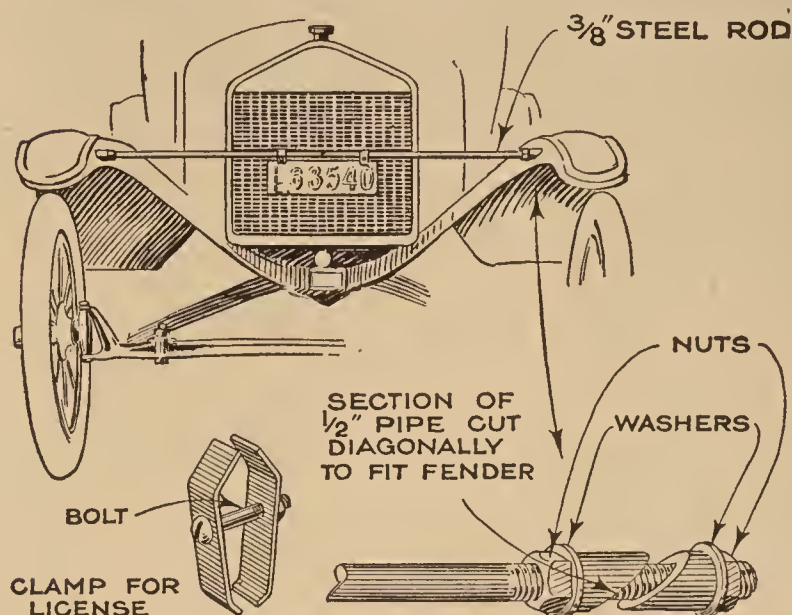


the film to be washed is wound. The size of the base is about 12 in. square and is drilled with $\frac{1}{2}$ -in. holes, into which the pegs, about 5 in. long, are driven, and secured with screws from

underneath. A film clip is attached to the outside peg, and a small screw, or pin, is driven into the last peg, with about $\frac{1}{8}$ in. projecting. A small chain, such as a key chain, is obtained, and one end of it is fastened to another film clip. A piece of iron or lead is fastened to the bottom of the device to keep it from floating. To use the washer, one end of the film is held in the outside clip, and the strip is wound around the pegs, as shown, the emulsion side, of course, being outward. The clip on the end of the chain is fastened to the other end of the film, which is drawn up moderately tight; then a link of the chain is hooked onto the screw, and the film is held in place. If the film is not quite long enough to go around, a few pegs may be missed and the film brought to the last peg. The washer is then placed in a vessel of water and the film washed in the usual manner. — William Underwood, Tunnel Hill, Ill.

Combined Fender Brace and License Bracket

A great deal of the noise set up by light automobiles is the result of rattling fend-

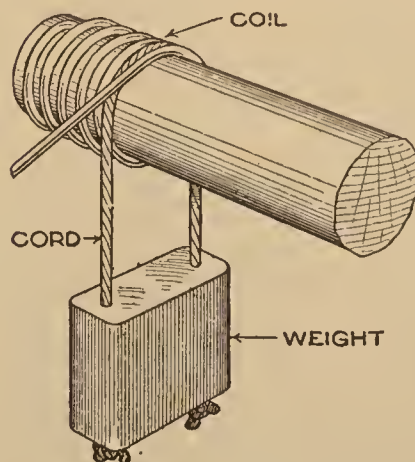


Braces for Front and Rear Fenders of Light Automobiles Help to Reduce the Objectionable Noise of Rattling Sheet Iron

ers, which, even at moderate speed, make a horn so much excess weight. The drawing shows a fender brace that not only holds the fenders rigid but forms a convenient support for the license plate. A piece of $\frac{3}{8}$ -in. steel rod is threaded, for several inches, on each end and attached, through holes cut in the fenders, by means of nuts, washers, and pipe wedges, which are screwed up tight against both sides of the fenders, as shown in the drawing. Similar braces may be fitted to the rear fenders. Small metal clips, formed from $\frac{1}{8}$ or $\frac{3}{16}$ -in. sheet metal and held together with stove bolts, are used for clamping the license plate to the brace.

Spacer for Coil Winding

When winding coils for electric heaters, where the turns of wire are required to be evenly separated from each other, considerable care is necessary to make the separation uniform. A piece of cord, the same thickness as the space required between the turns, and a small weight are used to make the simple device shown in the

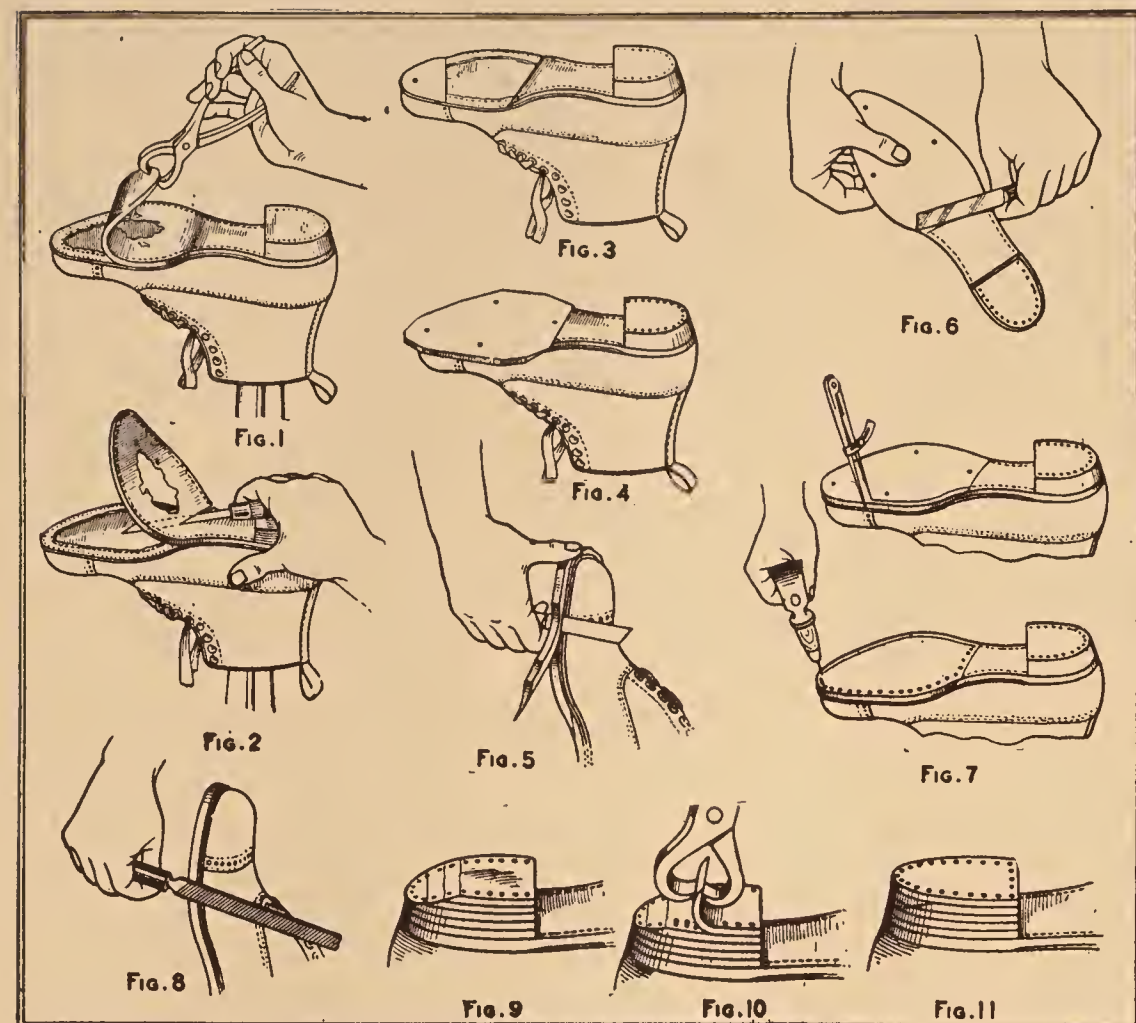


drawing. Both ends of the cord are attached to the weight and the device is placed on the coil-winding mandrel, as shown, automatically spacing the turns.

How to Mend Shoes

BY FRANK M. RICH

EVERYBODY wears out shoes, and "by the same token" everybody ought to know how to mend them. The statement that shoe profits are "paper" profits only serves to confirm a lurking suspicion that paper is involved somewhere, a suspicion first engendered by the rapidity with which many shoes wear out. "Cobbling" is not high art but it is good economy, and he who has a pair of old shoes that can be renovated by straightening up the heels and adding new taps, or half soles, and does these things, contributes his bit toward reducing the cost of living.



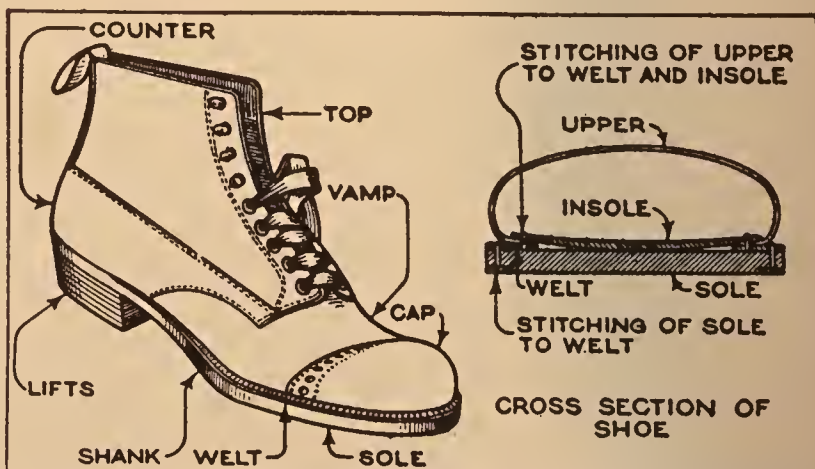
Almost Anybody can Learn to Do a Good Job of Shoe Repairing in a Short Time, and Even If One Is Not Naturally "Handy with Tools," the First Attempt will Be a Revelation. Figures 1 to 8 Show the Various Steps in Half-Soling a Shoe, and Figures 9 to 11 Show How Worn Heels are Repaired

An outfit of shoe-repairing tools and materials is simple and inexpensive, and the whole can usually be purchased for less than the price of a set of soles. Before proceeding with the actual work, it is well for the "cobbler" to familiarize himself with the various parts of a shoe, as shown in the small drawing, after which he is prepared to tackle a job of half-soling.

First, the shoes are set on the leather and the new taps are marked out and cut a trifle larger than the old sole; these pieces are soaked for a few minutes in warm water, to soften the leather. While the leather is thus "mellowing," the old sole is removed, as in Fig. 1. Cut the

thread with a knife, if the soles are sewed on, and, if the shoes have never been re-soled, the worn sole is cut off at the shank, as in Fig. 2, paring the shank down to a thin taper or scarf, to make a neat splice with the new sole, which should be similarly scarfed. The leather is removed from the water and pounded on the last, evenly and thoroughly, with the hammer, to "harden" it. The shoe is then placed on the last and a piece of shoemakers' tarred felt, half the length and width of the sole, is placed under the sole to prevent squeaking. If the toe of the shoe has been worn down so that the welt is not in good condition, a tapering piece of leather is tacked to the toe to build it up, as in Fig. 3. The sole is fastened in place with four nails, as shown in Fig. 4. In nailing, the pegging awl is used to start the nail; the hole is not made too deep, just deep enough to hold the nail in position. The nails are not driven perpendicularly but with a slight slant toward the center, to hold the sole more securely.

After the sole has been tacked to the shoe as shown, the surplus leather around the edge is trimmed away, as in Fig. 5, so that it will be approximately flush with the sole; this is necessary so that the repairman will have an approximately correct outline to work from in order to get the nails in evenly. Figure 6 shows how the tap should be pared, or scarfed down,



A Study of the Component Parts of the Shoe is Suggested before Starting to Work

at the shank to make a neat joint at the point where the new sole laps over and joins the old one.

A line is scribed with a compass, or by other means, as indicated in Fig. 7, at a point from $\frac{1}{4}$ to $\frac{1}{2}$ in. from the edge of the sole; this depends upon the size of the shoe and the width of the welt beyond the upper. Then awl holes are made at $\frac{1}{2}$ -in. intervals along the line, and the nails are driven in. Be sure the nails strike the last and clinch, and pound the heads down flush with the surface. If any nails bend over, withdraw them and put in new ones. Allow the leather to dry slowly, and then finish off the edge of the sole with a rasp, or a piece of broken window glass, which makes a good scraper. If a finer finish is desired, sandpaper can be used. After the soles have been finished the raw edges are coated with shoe polish to correspond with the color of the shoe.

Normally most persons wear the heel off at the back, as shown in Fig. 9, while others walk so that the heel runs over at either side. In such cases the worn top pieces, or "lifts," as they are called, are removed, as in Fig. 10, and the projecting nails or pegs pulled out; then the heels may be built up of tapered pieces in the same manner as described for repairing a worn toe. These pieces serve to use up the odds and ends of leather. The small wedge-shaped pieces are tacked to the heel, and the bottom lift is applied in exactly the same manner as the sole, the finished job appearing as in Fig. 11. Of course there is no objection to removing all the worn lifts and replacing them with new ones, if leather is available.

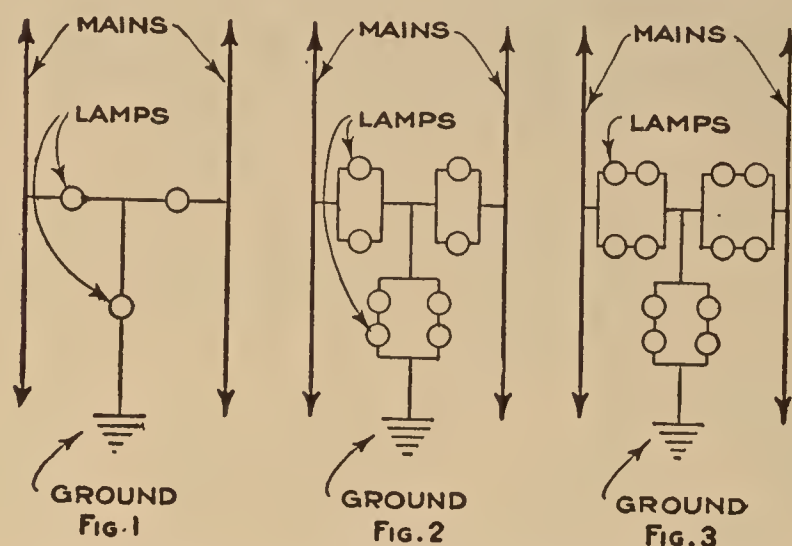
Before the mended shoe is ready for wear, it is well to go over the nail heads with a file to take off any slight projections; examine the inside for nails and pound down thoroughly any projecting points or prominent clinches. A lining of thin leather cemented over the insole is desirable, especially at the heel.

Anybody can learn to do a good job of shoe repairing in a short time, and even if one is not naturally "handy with tools," but uses care in nailing and cutting, the first attempt will generally be surprisingly good.

Carbon-Lamp "Kick-Back" Preventer

To protect fixtures and house wiring from high-voltage "kick-backs," and to prevent the lights from blinking when using a wireless-transmitting set connected to the house current, a kick-back

preventer is a necessity. Such a device may be made up of a number of carbon



Carbon-Filament Incandescent Lamps, Connected across the Supply Line and Grounded at the Center, Protect against High-Voltage Surges from Wireless Transmitters

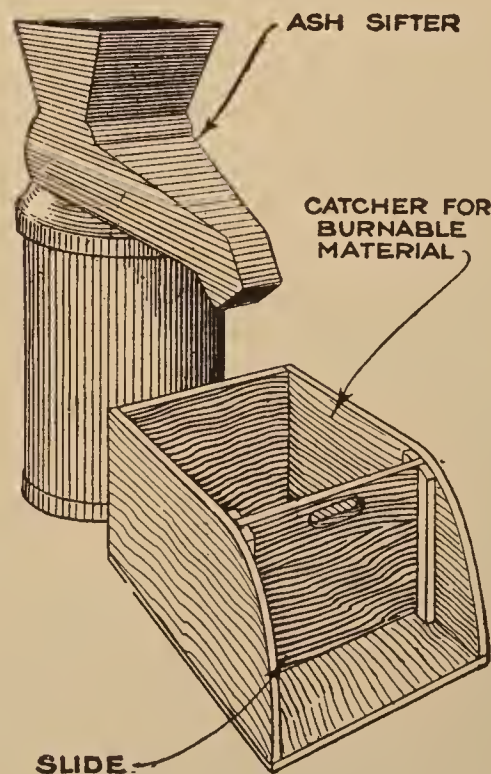
lamps connected across the power line and grounded at the center, as shown in the drawing.

Two carbon lamps are connected across the line, the connecting wire between the lamps being grounded through the third lamp, as shown in Fig. 1. This arrangement will give sufficient protection for low powers. In Figs. 2 and 3 are shown diagrams of preventers that have ample capacity for taking care of surge-backs up to the maximum voltage used by amateurs. Carbon lamps are used because they will carry heavy overloads.

Catcher for Ash Sifter

When ashes are sifted in the basement, the usual practice is to allow the reclaimed material to remain on the floor, where it drops from the sifter. The drawing shows an easily made receptacle, for the cleaned ashes, to be placed under the ash sifter.

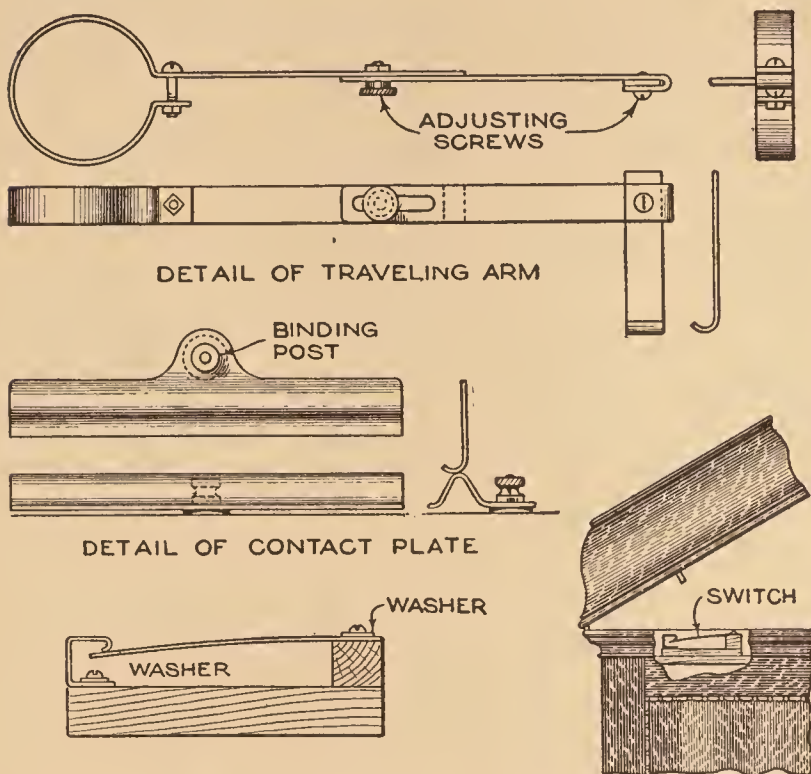
The box is substantially made of $\frac{1}{2}$ -in. wood, or an ordinary packing case of the desired size may be used by removing one end. Two strips are nailed on the inner surface of each side to hold a slide, which prevents the combustible material from



scattering over the floor. When the catcher is filled, the slide is lifted, and the reclaimed material may be shoveled into the furnace again without messing up the floor. — George Simonson, Springfield, Massachusetts.

A Lighting System for the Phonograph

Operating the phonograph in the dark, or with insufficient illumination, fre-

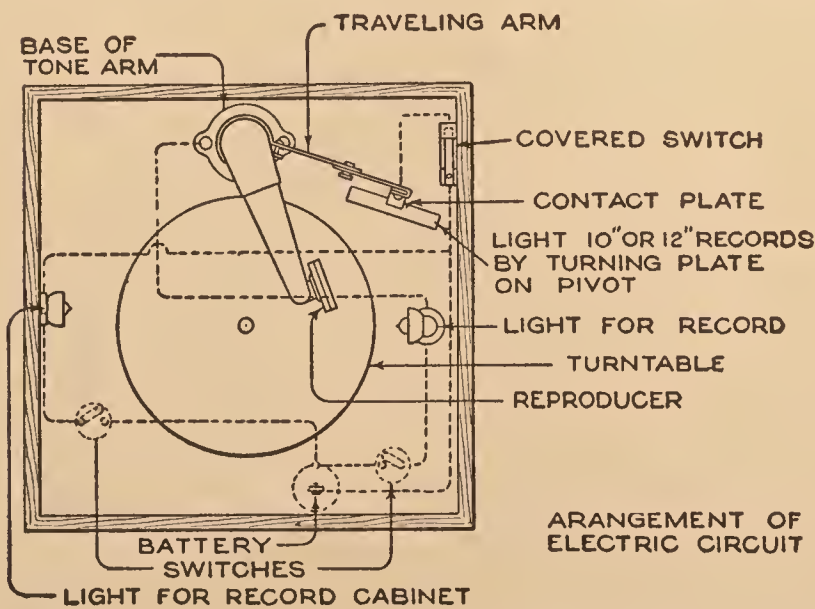


AUTOMATIC SWITCH OPERATED BY COVER

Detail Drawing Which Illustrates the Construction of the Traveling Arm, Contact Plate, and Automatic Switch: No Dimensions are Given. Owing to the Variations of Construction and Design of Different Machines

quently results in serious damage to a favorite, and possibly expensive, record, and it was to avoid this that the lighting arrangement described was worked out.

A traveling arm, shown in detail in the drawing, is attached to the tone arm of the machine. This arm is made adjustable for length, and is provided at its outer extremity with a very flexible contact spring, which closes the circuit and



Wiring Arrangement Showing How the Lamps and Dry Cells are Placed with Relation to the Wires and Switches

lights the lamp when the record is started. The contact plate, formed as shown, is attached to the bed of the machine, both the traveling arm and contact being adjustable so they will make a contact at the proper time for different-sized records. The binding post of the contact plate is an ordinary wood screw. A washer is placed between the plate and the machine to provide clearance, to permit its being turned as required. After this contact plate has been made and attached to the machine, the position of the traveling arm is set to make a contact when the needle in the reproducer is about $\frac{1}{8}$ in. from the edge of the record turntable.

The automatic switch, controlling the current, consists of a wooden base, to which a spring contact is attached that breaks the circuit when the cover is lowered, a lug being provided for opening it, as shown. The switch is attached to the body of the machine just inside the cabinet, and the wiring arrangement, which is clearly indicated, includes a light over the record cabinet, operated separately by its own switch.

When the cover of the machine is raised, contact is made in the automatic switch; then, when the needle is brought near the edge of the record, preparatory to playing, the traveling arm completes the circuit with the contact plate and lights the lamp, which goes out automatically after the first few grooves on the record have been played and the contact spring passes over the plate.—L. B. Robbins, Harwich, Mass.

Making Bright Prints from Underexposed Negatives

Bright prints may be obtained from negatives which are usually regarded as too thin, by the following method:

Expose the print in the usual way, exposing rather longer than usual, then develop for a longer period than customary, until the final result is very heavy, the picture appearing buried. It is fixed, and well washed, and is then placed in a reducer made by dissolving 60 gr. of potassium iodide in a pint of water, and, when dissolved, adding 6 gr. of iodine. Placed in this solution, the whole paper of the print turns blue-black, and the image itself reduces rapidly. The reduction must not be allowed to go too far, however, and the print is then rinsed and placed in clean hypo. This turns the paper white, and dissolves any silver iodide, leaving a vigorous print. A thorough wash completes the operation. It

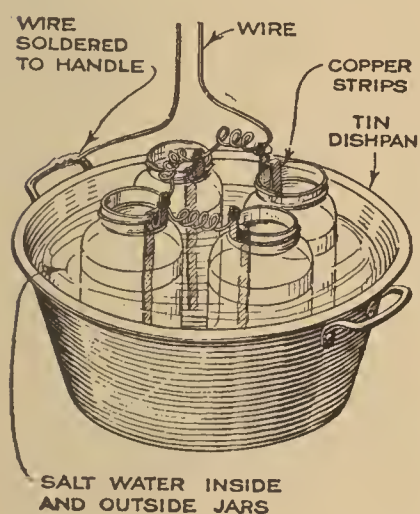
is better to reduce too little than too much, as the latter is irremediable, whereas the former can always be corrected by a second treatment.—H. J. Engel, New Braunfels, Tex.

Improving Gas Mantles

Gas mantles may be greatly improved, both as to durability and illuminating power, by immersing them in vinegar. A cup is filled with ordinary vinegar, in which the new mantle is suspended for 10 minutes. It is then hung up to dry, after which it is ready to be fitted to the burner in the usual manner.

Emergency Wireless Condenser

While operating a high-frequency set, an amateur wireless operator had the misfortune to burn out his condenser.



Desiring to resume operation as soon as possible, he assembled the emergency condenser shown in the drawing. An old tin dishpan was obtained, and four ordinary fruit jars were set in the pan, which was filled to within about 2 in. of

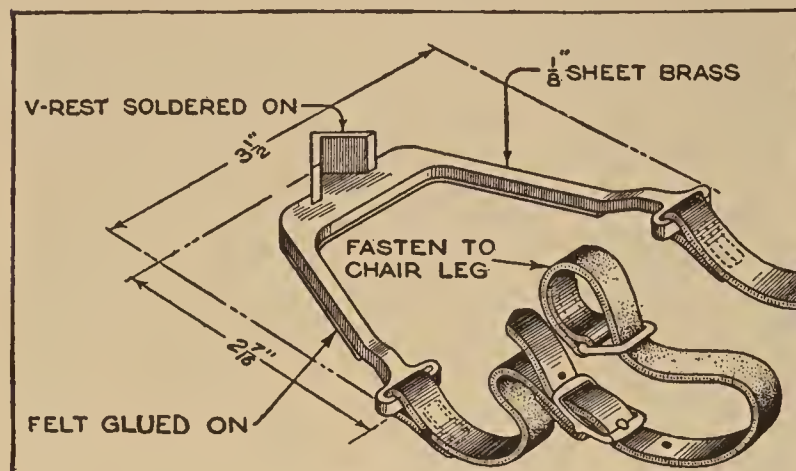
the top with strong salt water. Each jar was also filled with salt water to the same level. Then a copper strip was placed in each jar and a connection made to each strip, the other wire being connected to the tin pan. This makeshift condenser was found very efficient and was used for several months. As the water evaporated, a fresh supply was added from time to time.—Hubert Griffiths, Montreal, Que.

Pipe Cleaner for Fountain Pens

Ordinary pipe cleaners, which may be purchased at practically all cigar stores, are suitable for cleaning fountain pens. Syringing the barrel of the pen with water will remove partly dried ink, but it is difficult to shake out all the water after this operation, and usually enough will remain to dilute the ink to such an extent that the writing will be faint. If the barrel is swabbed out with a pipe cleaner after the syringe is used, this difficulty will be overcome. The cleaners cannot be used with self-filling pens that are equipped with soft-rubber ink sacks.

Simple Device Prevents Support Rod of Cello from Marring Floor

Players on a violoncello are frequently hard put to prevent the support rod of their instrument from marring finished

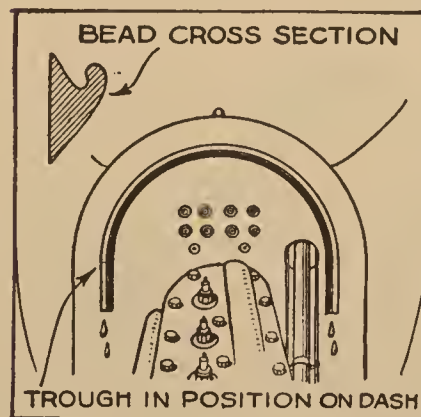


A Device for the Violoncello Player That Makes It Impossible for His Instrument to Slip or Mar the Finest Polished Floor

floors, and slipping on the polished surface. The device shown in the drawing provides a rest for the support rod and prevents the instrument from slipping. A piece of 1/8-in. sheet brass is cut to the form shown, and an upright V-shaped piece is soldered, or brazed, to the front; a piece of felt is fastened to the underside of the sheet brass, with shellac, to prevent damage to the floor finish. An adjustable leather strap is sewed into each of the eyes provided in the brass piece, and these terminate in adjustable loops, as shown. In use, the loops are placed over the front chair legs, with the metal part on the floor at the required distance in front of the chair. The end of the support rod is placed against the V-shaped projection, from which it cannot be removed accidentally.—Edwin A. Elliott, Brooklyn, N. Y.

An Eaves Trough for the Light Car

A well-known light automobile has the objectionable habit of "quitting cold" when rain runs down the cowl, under the



hood, and short-circuits the ignition coils. To eliminate this trouble, an eaves trough, made from a section of the bead from an old clincher tire, is tacked onto the dash just beneath the hood. The

cross section of the bead forms a natural trough with sufficient capacity and curvature to carry off all the water that finds

its way underneath the hood. A thin coating of rubber cement along the line of contact with the dash will prove of additional value and dispense with the necessity of using so many tacks.

An Oilcloth Luncheon Set

A pleasing luncheon set, that is lasting and requires no laundering, can be made of oilcloth, hand painted in oil in some



Disks of Oilcloth Decorated in Contrasting Colors
Make a Pleasing and Sanitary Covering for the Dining Table and do Not Require Laundering

conventional design. Circles of various size are laid out on the cloth with a compass, those shown in the engraving being 8 in. and 36 in. in diameter, respectively. After the circles have been cut from the piece, the design is marked on the face of the pieces; this is accomplished by laying out the design on tissue paper and transferring it to the oilcloth by tracing. Then the lines are filled in with oil paints of the proper color. The paints can be obtained at paint and art-goods stores in small tubes. The colors should be mixed rather thin with turpentine, and should not be applied too heavily. For the daisy design illustrated, two shades of yellow and two shades of green were used.—Mrs. Jessie S. Hawthorne, Maywood, Ill.

Making Photographic Name Plates

Name plates or signs with gold or silver lettering on a black ground may easily be made by the photographer in the following manner: The wording is first very carefully drawn in pencil on a sheet of white cardboard, and neatly blocked in with India ink. The design is then photographed to the size desired. The negative, which has transparent letters on a dense black ground, is then painted on

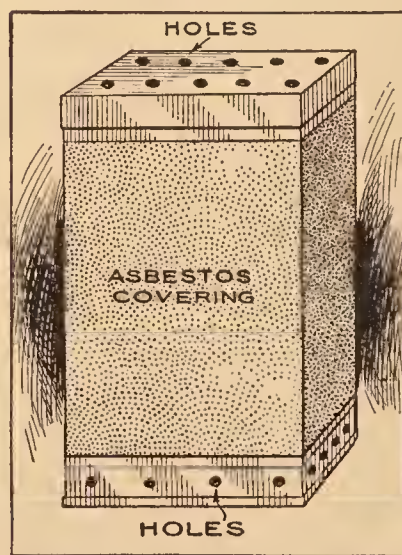
the film side with gold or silver paint; it can be covered with glass and framed or mounted in any manner required.

Soap Molds for Plaster Patterns

Plaster patterns for small metallic castings are easily made in soap molds which are quite easy to make. Ordinary laundry soap, in bars, that will stand cutting without breaking or cracking, is used for the purpose. The bars of soap are squared off at the sides so that the necessary number may be stuck together, to form a single piece of soap without hollows, or other depressions. Moisten the edges that are to be joined with hot water and press together firmly. When the joints have set well, the mold is carved out of the soap with a knife, or other tool. The plaster pattern is made by filling the soap mold with plaster of Paris mixed with water. After the plaster has thoroughly dried, it is removed from the soap mold and placed in the sink, where any adhering soap is washed off. When the plaster pattern has dried, it is given a coat of shellac; it is then ready for making the sand mold in which the casting is to be poured.—R. L. Ogden, Denver, Colo.

Hand Warmer Made from Mustard Can

A mustard can, of a convenient size, may be used for making a hand warmer. After the label has been removed from



the can, a row of holes is made near the bottom edge and several holes are made in the lid. The inside of the can is lined with asbestos paper, held in place with water glass, or sodium silicate; the outside is similarly covered with the exception of the lid; the holes

should not be covered up. In use, the can is partly filled with powdered charcoal, and one corner is lighted with a match. Allow the fuel to smolder for a few minutes until the fire spreads across the top; then replace the cover. Such a heater can be carried in the pocket and will retain its heat for several hours.

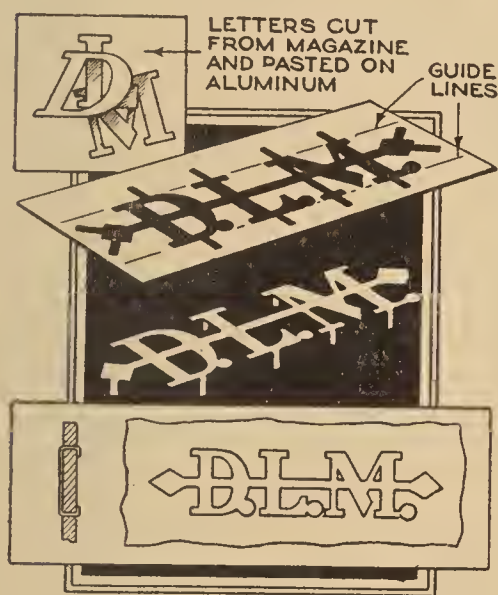
☞ Benzine will remove chewing gum from rugs or clothing.

Keeping the Runner in Place on the Porch Table

It is difficult to keep the runner on the porch table in place when the wind is blowing, but the following method will keep it in position in anything short of a gale: A narrow facing, about $\frac{1}{2}$ in. wide, is stitched on each end of the runner just above the hem or trimming; one end of the facing is left open, and a rod, slightly shorter than the width of the runner, is slipped into it. The rod will hold the cloth straight and smooth, and is easily removed when the runner is to be laundered.

Aluminum Monograms for the Automobile

An aluminum monogram makes a neat and attractive mark of identification for the automobile, and is easily cut from the sheet metal with a pair of shears.



Letters of the style desired are cut from the pages of a magazine and pasted to the face of the metal, to serve as a pattern; after the monogram has been formed, the paper letters are easily soaked off.

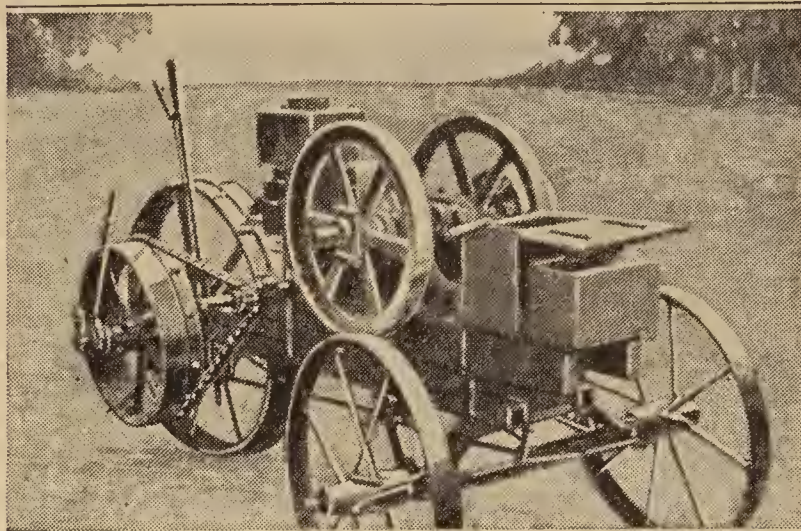
For attaching the monogram to metal-door panels ears are required at the top and bottom; these are inserted into slots cut in the panel, and bent over, as indicated in the drawing. If the panel has a wood backing, holes are drilled in the monogram and it is attached with small nails, the heads being filed flush. An ordinary pocket-knife and three-cornered file are useful for removing rough edges, and for finishing the letters.

Hot Water Aids in Removing Slivers

To remove slivers, fill a small bottle with hot water; then place the spot containing the sliver over the mouth of the bottle and press down, so that the part is held close. Unless the sliver, or splinter, is a very large one it will come out of itself after a few minutes of this steaming. The heat from the steam also serves to relieve the wound of much of its soreness.

Making a Stationary Engine Propel Itself

Alternate jobs for the stationary engine, first at the well, in the pasture, and then



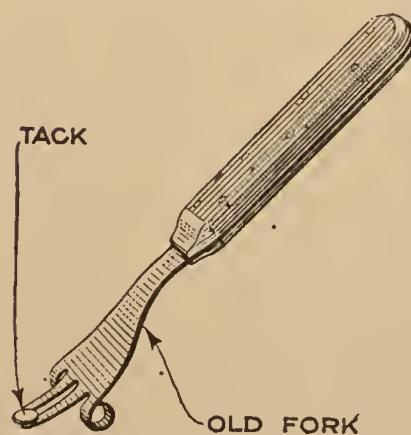
Loading Even a Small Stationary Engine for Transport to Different Jobs Was Too Bothersome for This Farmer, So He Made the Engine Haul Itself

at the barn, a half mile away, prompted the farmer owner to rig the engine up so that the necessity of loading and unloading it into a wagon for each trip would be eliminated.

The photograph shows at a glance the details of this arrangement. The power of the engine is conveyed to the old mower wheel at the rear which provides traction. To the shaft of the rear wheel, a clutch pulley is keyed. The inner periphery of this is provided with studs that serve as gear teeth and engage with the link chain, to which power is delivered through a horizontal jackshaft connected to the engine pulley by a short belt. The engine is steered by manipulating the long lever shown, which is connected to the front axle by iron rods.

Old Fork Makes Tack Lifter

The drawing shows how an old fork can be converted into a simple and effective tack lifter.



A four-tined fork is required for the purpose, and the tines are cut off to leave them about $\frac{3}{4}$ in. long; the outside tines are bent back underneath, as shown, to provide a fulcrum for the lifter, and the two center tines are filed off a little on the underside of each end so that they may be easily inserted underneath the tack heads.—C. A. Black, Jr., Hightstown, N. J.

Desk Made from Old Organ

A paraphrase on a familiar advertising slogan might be: "Have you an old organ



An Attractive Writing Desk is Made from an Old Organ. The Reed Box at the Top is Made into a Secret Compartment. The Writing Table was Built Over What Was Once the Keyboard

in your home?" One man had not only one but two of them, both mute as the tomb. By combining parts of the two organs he made one good instrument and converted the other into a writing desk, or secretary, as shown in the photograph. After removing the "works" from the old organ, a flat writing table was built over the former location of the keyboard. The top, which contained the reeds and pipes, was made into a secret compartment.—Oden Liljegren Fern, Pasadena, Calif.

Making the Oil Stove Portable

A wheeled platform is an added convenience for users of oil cookstoves in localities where gas is unavailable. As



shown in the photograph, a strip is nailed around the edges of the platform to hold the stove in position, and the casters elevate it above the floor so that the cook's toes do not come in contact with it. Such a plat-

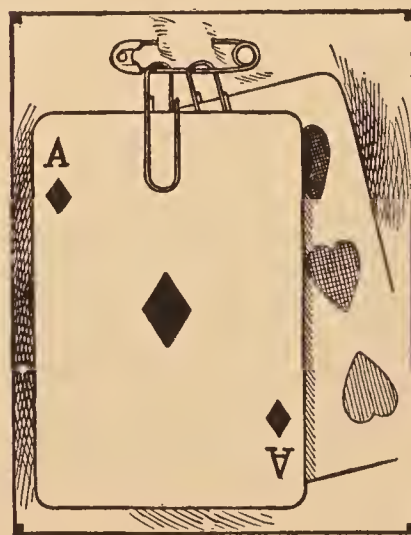
form makes a convenient place for keeping the cooking utensils and accessories most often used.

How to Make a Slow-Acting Relay

The electrical experimenter will often find a slow, or delayed-action, relay valuable when building electromechanical remote controls, and many forms of automatic systems. The size and type of relay will be determined by individual needs. The wire is unwound from the relay coils and one layer of insulated, heavy copper wire is wound on each core. Holes are made in the flanges, and the ends of these heavy windings are brought out at each end. The regular magnet wire is rewound over the heavy winding on each coil, care being taken to see that the wire is wound on the separate coils in opposite directions; the magnet windings are connected as they were originally. The heavy windings are short-circuited by uniting the ends on the outside of each coil; this is done to prevent leaving a hump in the coils, when they are rewound. The relay has now been made slow-acting, and when current is applied to the active winding, the armature will not respond instantly, but hesitates for the fraction of a second before it closes.—C. M. Crouch, Minneapolis, Minn.

Paper Clips Make Magician's Card Holder

A quickly arranged card holder, for performers of magic and legerdemain, is found in the ordi-



nary wire paper clips obtainable at any stationery store. These clips are sewed to the lining of the clothing, or held by means of a safety pin, in the manner shown in the drawing. A great number of cards can be held "in reserve" by this

method, and while held securely, they may be drawn with only the slightest effort.—Elmer O. Tetzlaff, Milwaukee, Wis.

Leggings Made from Boot Tops

Many hunters and others cannot wear rubber boots on account of the discomfort of perspiring feet. Those who desire to wear shoes and still have waterproof protection for their trousers and legs, when walking through wet grass, may do so at slight expense. The feet are cut

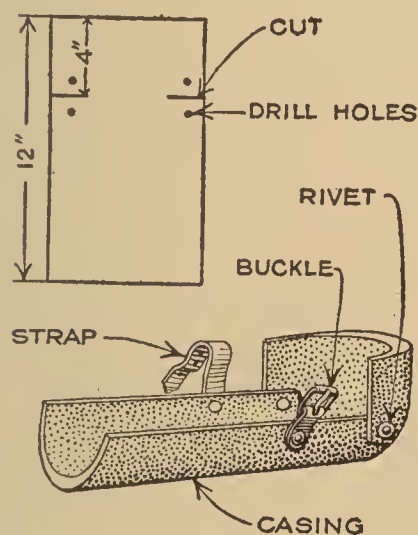
from a pair of old boots at the ankles, and the tops are worn as leggings. First, slip on the boot tops over the trousers, and then put on and lace the shoes. The boot tops slip down snugly against the shoes, keep out burs and other weed seeds, and keep the trousers dry and the legs warm.—Thaleon Blake, Sidney, Ohio.

Tire Tape Repairs Clothes

The motorist and cyclist often meet with accidents that result in torn garments at some conspicuous location. However, as they usually carry with them a supply of adhesive tire tape, the torn spot can be patched up by applying the tape to the edges of the tear on the underside of the cloth.

Knee Pads Made from Auto Casing

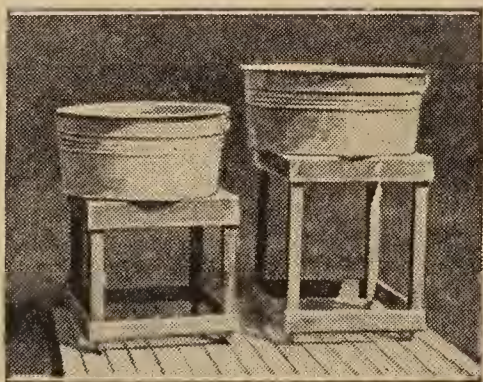
Persons whose work requires them to be in a kneeling position much of the time, such as carpet layers, concrete workers, etc., will find that a substantial, durable, and waterproof pair of knee pads can be made from old automobile casings, as shown in the drawing.



A 12-in. length is cut from an old casing, and about 4 in. from the end, two 1-in. slits are made at each side. The short end is then bent up, as shown, and riveted into place. A suitable strap and buckle completes the job.—Truman McNiel, Seattle, Wash.

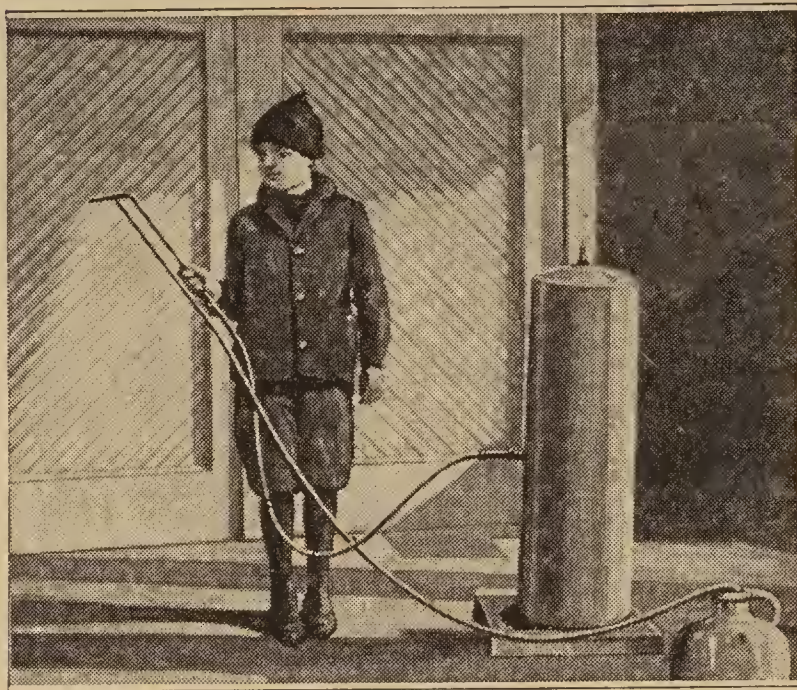
Tables on Casters Make Moving of Washtubs Easy

By mounting small tables on casters, as illustrated, much of the back-breaking work associated with washing day is banished. The wringer can be mounted on the taller table and the clothes passed into the tub on the lower one, which is then wheeled out to the line.—Mrs. R. D. Shultis, Greeley, Colo.



Cleaning the Auto with Sprayer and Air Tank

The motorist who owns a sprayer of the type illustrated can make good use of it for washing his car, thus applying



A Compressed-Air Sprayer need Not Remain Idle Where There Is Car Washing to be Done

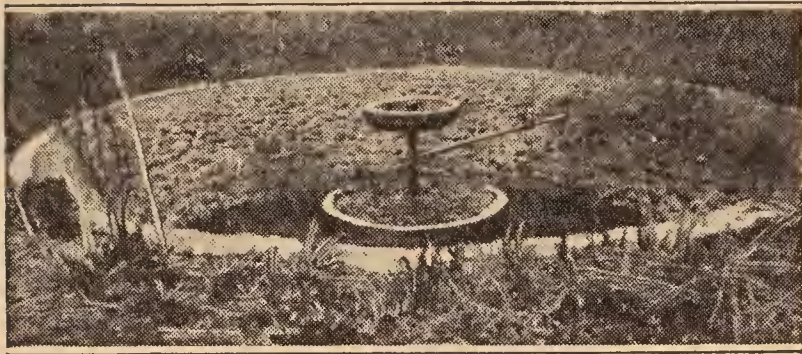
“machine methods” to one of the most disagreeable of the tasks of car keeping. The sprayer is provided with the usual two lengths of rubber hose; one leads to a compressed-air tank, while the other dips into a jug filled with the cleaning fluid. Such a fluid may be water, a mixture of water and gasoline, or some other of the liquids in common use for car cleaning.

Designs Produced by Phonograph

The revolving record table of any phonograph provides a means of making excellent freehand designs. A circular disk of soft wood, the same size as the table, is made, and provided at the center with a hole for the motor shaft; this disk should be thick enough to come flush, or a little above, the top of the shaft. To the wooden disk a sheet of paper is attached with thumbtacks, and the table is set in motion. With a pencil, make a number of reciprocating, circular, elliptical, or other movements from the center toward the edge of the paper, then stop the machine and observe results. With a little practice, and by using different movements and positions of the pencil and varying the length of the movements, an unlimited variety of complicated and pleasing designs can be produced. The pencil should not be pressed against the paper too heavily, or the table will stop and spoil the design.—H. R. Howie, Swansea, Ont.

A Novel Lily Pond

In order to provide open water in a lily pond for his children to sail their toy



In Rebuilding His Lily Pond the Owner Installed a Central Root Bed and Bird Bath. As the Lilies Grew from the Center of the Pond, a Margin of Open Water was Left for the Children's Boats

boats, the owner drained off the water and made some radical changes in its construction. Originally the lily roots were planted indiscriminately in the mud at the bottom of the pond, and soon the plant growth completely covered the surface of the water. After the pond had been thoroughly cleaned, a circular concrete root bed was made in the center of the pond. This was accomplished by using a sheet-metal form made by riveting the ends of strips of sheet metal together. As the outer part was larger than the inner one, small blocks of wood were placed between the two to hold them a uniform distance apart, and the space was filled with concrete. After it had set, the center was filled with earth, and the lily roots replanted.

While the pond was being rebuilt, it was decided to add a bird bath; this was made by forming a square lump of cement on a rough board platform. The platform was mounted on a piece of pipe that projected through the mass of concrete; the bottom end of the pipe was set over a pin in such a way that the platform could be revolved. When the cement mixture had set to the proper consistency, all projecting corners were turned off with a hatchet blade while the table was revolved. The bath was then turned over and the inside hollowed out in the same manner, the operation being similar to turning a round wooden shape on a lathe. When the bowl was hard, the pipe was removed and a nipple substituted. Flanges were screwed down over the nipple, inside and outside, to make a water-tight joint and were plastered over with cement. The top of the nipple was covered with a pipe cap drilled with small holes, to make a fountain when connected to the water-supply pipe, as shown. In the completed pond all the

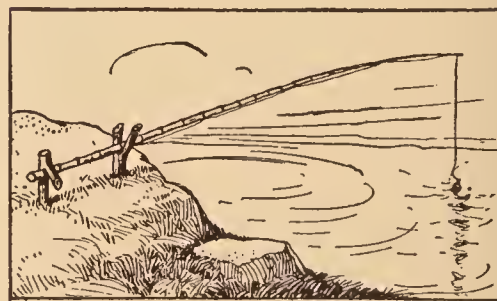
lily stalks grew from the center, and consequently the water about the edge was left open for the children's boats.

Eggshell Makes an Emergency Funnel

When it is desired to fill vinegar cruets, or narrow-necked bottles, and a funnel is unavailable, one can be improvised from an eggshell. The shell should be quite dry and a small opening is made at the bottom. Stand the shell so that the hole is well over the opening of the container to be filled, and proceed as with a regular funnel.

A Handy Fishing-Rod Rest

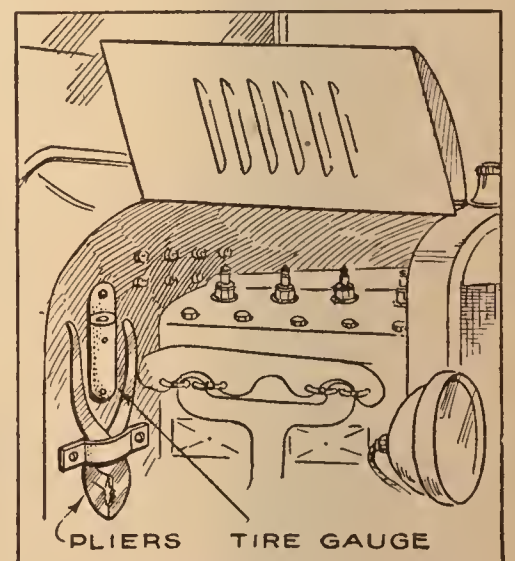
The usual practice of sticking the butt of the fishing rod into the earth is open to the serious objection that the handle is covered with mud and dirt. A much better arrangement, for resting the rod



while the fisherman is waiting for a "strike," is made from two forked branches, as shown in the drawing. The ends of the branches are pointed and pushed into the earth about 2 ft. apart.—Chester Cooper, Glenville, W. Va.

Small Tools Carried under Auto Hood

When the motorist searches for his pliers, tire gauge, or other often-needed tool, under the seat, or in a tool box filled with a miscellaneous assortment of old rags and other rubbish that the average automobile owner is wont to keep among his tools, his exasperation is not lessened



by the fact that he has himself to blame. The tire gauge and pliers, the former in its case and the pliers hung in a leather strap, are made conveniently accessible by attaching them to the back of the dash, underneath the hood, as shown in the drawing.



The Construction of a Polarized Relay

By THOMAS W. BENSON

THE trend of amateur construction is to utilize standard parts of easily obtained apparatus in making other devices with a minimum of work. A good example of this is the very sensitive polarized relay described in this article.

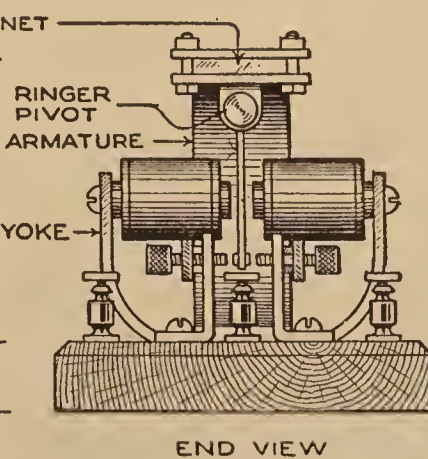
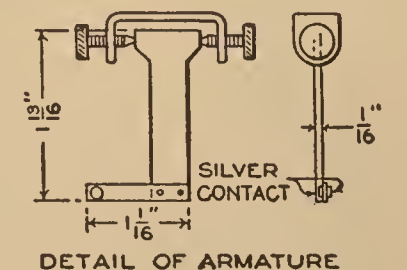
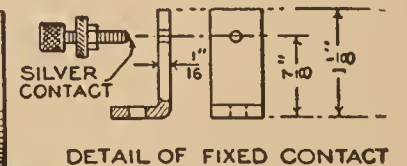
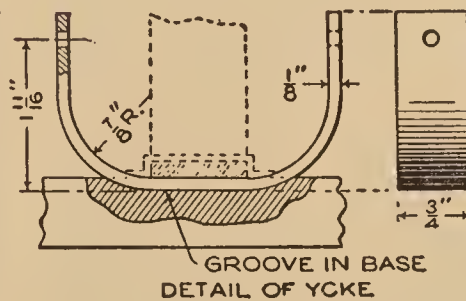
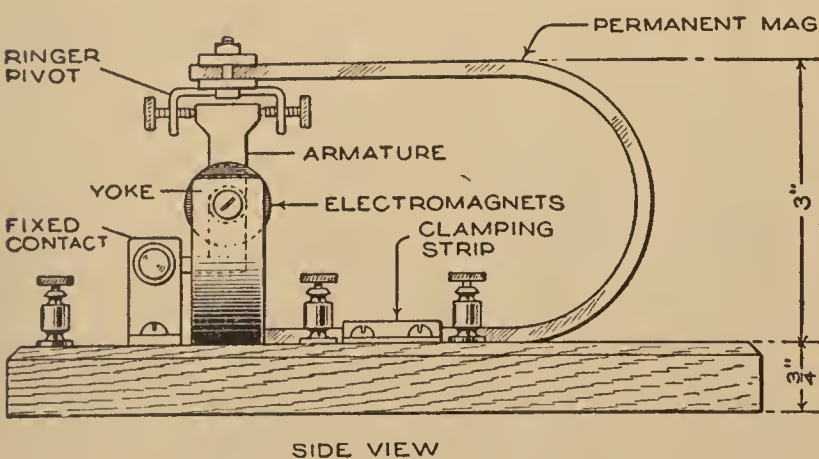
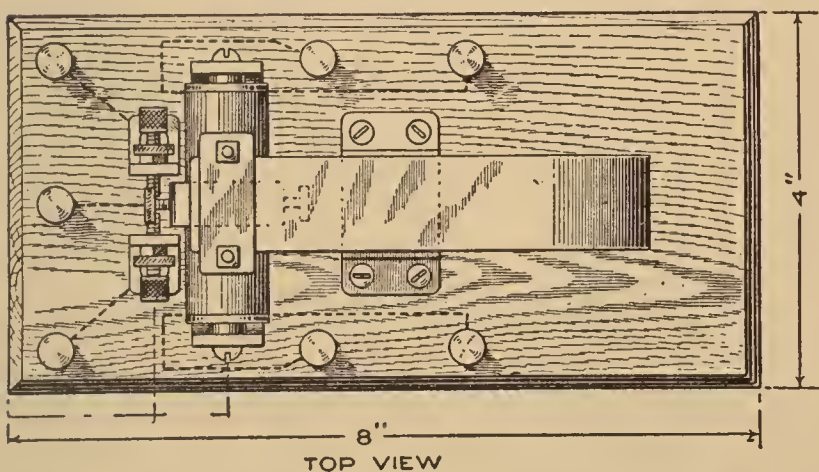
The permanent magnet, used in this relay, is from an old telephone magneto. The pivot for the armature is from a polarized ringer. The long ends of the ringer-pivot bar are cut off, and holes are drilled in it at such a distance from the center that two bolts inserted in them will straddle one leg of the magnet. A short piece of brass, or iron, is similarly drilled, for mounting the armature pivot to the magnet, as shown.

The armature is made of soft iron, just wide enough to fit between the pivot screws, and its length should be about two-thirds of the distance between the ends of the magnet. A center punch is

The rest of the armature may be cut down to the same width as the cores of the electromagnets. At the lower end of the armature a short piece of brass is riveted with small rivets made from copper wire. The free end of this brass strip is provided with a silver contact point, made by drilling a small hole in the brass, into which a piece of silver wire is riveted.

The electromagnets, wound for a resistance of about 75 ohms each, are from single-pole telephone receivers. These coils are mounted at the ends of a U-shaped iron yoke, so as to leave a space of about $\frac{1}{4}$ in. between the cores. The legs of the yoke should be long enough to bring the coils midway between the legs of the magnet. The coils are mounted with machine screws, through holes in the ends of the yoke, and should be lined up accurately.

The stationary contacts are made from



Parts Taken from an Old Telephone Magneto are Used to Make This Very Sensitive Polarized Relay, the Resistance of Which can be Varied to Suit Operating Conditions. By Using the Proper Posts the Cords can be Used Alone, in Series, or in Parallel

used to make recesses on the edges of the armature, for the pointed pivot screws.

brass strips, bent as shown. Holes for attaching to the base and to the adjust-

ing screws are drilled. The holes for the adjusting screws should be tapped to accommodate the screws, which should be provided with locknuts. Silver contacts are soldered to the ends of these screws.

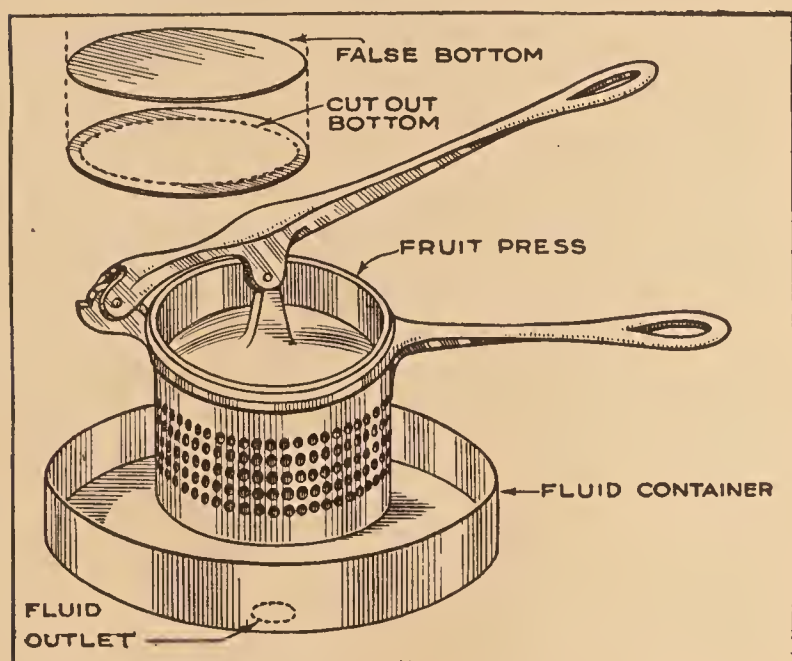
A groove is made in the wooden base to fit the yoke supporting the coils, as shown in the drawing. The yoke is held in place by the magnet, which is attached to the base by the brass clamping strip, as shown. A short length of fine copper wire is soldered to the brass strip on the armature, to carry the current. Each coil

should be connected to a separate set of binding posts; the two stationary contacts and the armature contact being connected to the other three posts.

By using the proper posts, the resistance of the relay may be altered as found necessary. With both coils in series, the resistance is about 150 ohms; using one coil alone, 75 ohms, and with both coils in parallel, about 32 or 33 ohms. In making connections, care should be taken to have the magnets form opposite poles on the different sides of the armature.

Fuel from Garbage and Sawdust

An ordinary fruit press, or potato ricer, can be used for making fuel briquettes



Sawdust or Other Combustible Refuse, in Combination with Oil, is Easily Compressed into Fuel Briquettes in an Ordinary Hand Fruit Press or Potato Ricer

from sawdust, or other combustible refuse, by compressing it together with kerosene. The bottom of the press is cut out, leaving a flange about $\frac{1}{4}$ in. around the edge, and a loosely fitting false bottom, made of a disk of sheet metal, is placed inside over the opening. The material to be compressed is mixed with kerosene in a pail, and the oil-saturated material is filled into the press and pressure applied, the surplus oil running off into a suitable container, as indicated in the drawing. After the briquette has been compressed, it is pushed out by pressure against the false bottom. The briquettes are set aside to dry, and may be used alone or in combination with other fuels.—Arthur J. Kelly, Brooklyn, N. Y.

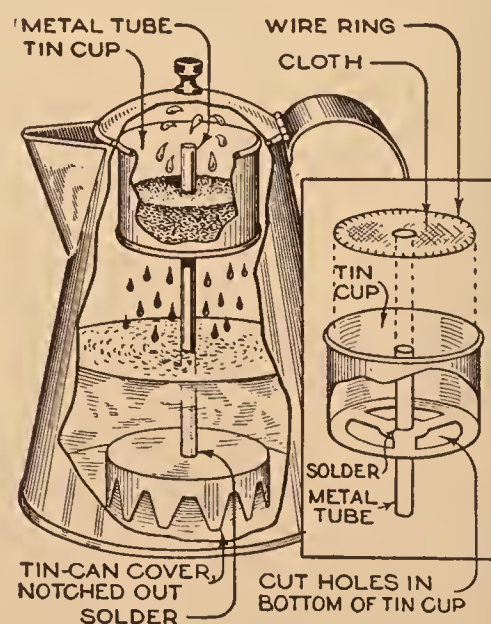
☐ A few drops of carbolic acid, or corrosive sublimate, mixed with paste for paperhanging, will prevent the breeding of insect pests behind the paper.

Photographing a Person in a Bottle

To make a photograph of a man or woman in a bottle, the camera is first focused to obtain a full-length pose. Before the exposure is made, an outline of the subject is marked on the ground-glass focusing screen. Normal exposure is given. After this exposure has been made, an ordinary clear-glass bottle is set up, and the camera adjusted so that the outline on the ground glass fits into the image of the bottle. A short exposure is made for the picture of the bottle, and the plate is developed. If properly made, the picture will show the person imprisoned within the bottle. A black background should be used in both cases.

Coffeepot Made into Percolator

Anyone who can do a little soldering can convert an ordinary coffeepot into a satisfactory percolator by the addition of the device shown in the drawing; it is made from a tin cup, a can lid, and a short



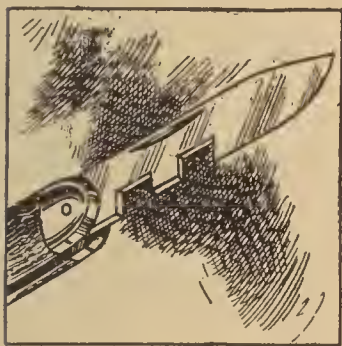
length of metal tubing. A hole is made in the bottom of the tin cup to accommodate the metal tube, and the remainder of the bottom is cut out in the manner shown. The diameter of the tin cup should be slightly less

than that of the top of the pot. To hold the finely ground coffee in the cup, a wire ring to fit the inside of the cup is made, and a piece of thin, white cloth is stretched

over and sewed to it; a smaller ring is sewed into the center in the same way. Any piece of metal tube will answer the purpose, but it should be about 1 in. shorter than the coffeepot; a piece of copper gasoline tubing will answer admirably. A cover from a tin can, a trifle larger than the tin cup, has a hole made in its center, and a series of notches cut around the edge, as shown. The metal tube is soldered to this lid, flush with the top, and to the tin cup, in the manner indicated. In use, the cloth-covered metal ring is fitted into the bottom of the tin cup, and the ground coffee placed inside; the water is placed in the pot, and the percolator is inserted in the pot as indicated. When the water becomes heated, it will be forced upward through the tube, and percolate through the ground coffee. Coffee made in this manner, being free of grounds, requires no settling.

Rabbit Cutter Made in Pocketknife

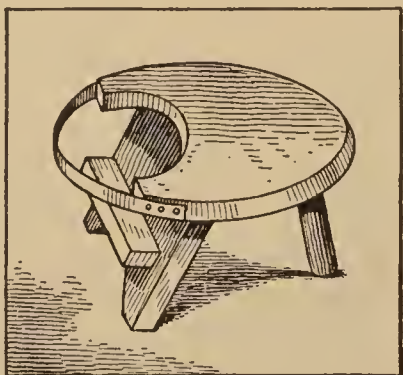
Having occasion to make a small number of boxes, with the lids sliding in grooves, and having no suitable tool to cut the rabbets, one mechanic solved the problem as shown in the drawing. Taking his pocketknife, he filed the blade for a short distance to a depth of $\frac{3}{16}$ in., leaving a projection of the same width as the size of groove necessary. When this projection was beveled to form a cutting edge, the job was finished in a very satisfactory manner.



A Convenient Milking Stool

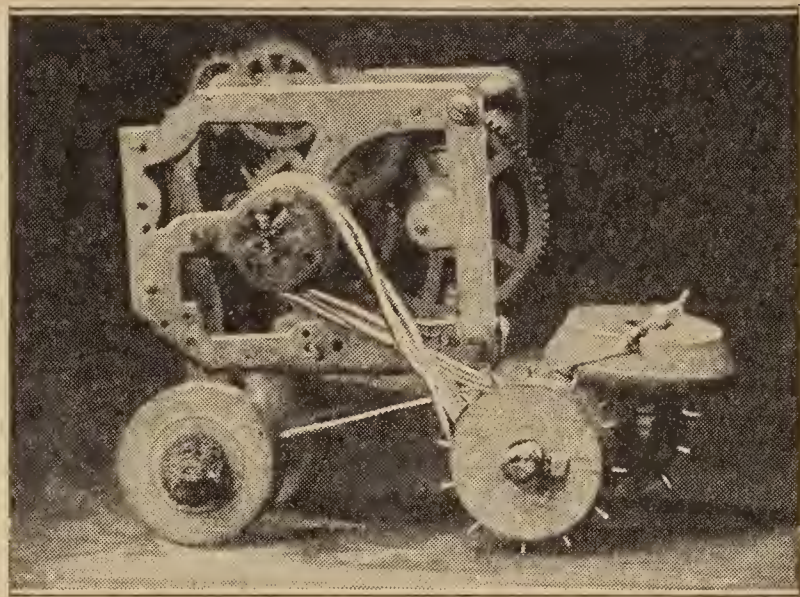
The stool shown in the illustration adds greatly to the comfort of the milker, doing away with the necessity of gripping the pail between the knees.

A piece of band iron is nailed to one side of the stool, as shown; the other end has three or four holes punched in it, which can be slipped over a nail, thus affording a means of adjustment for various sizes of pails. The cleat nailed to the front leg supports the pail.



Toy Tractor Propelled by Clockwork

A powerful toy tractor can be made by mounting the works of an old alarm clock on a small truck, as shown in the



A Small but Powerful Toy Tractor is Quickly Produced by Mounting the Mechanism of an Old Alarm Clock on a Truck Made from Blocks and Spools. A String Belt Transmits the Energy of the Clock Mechanism to the Wheels

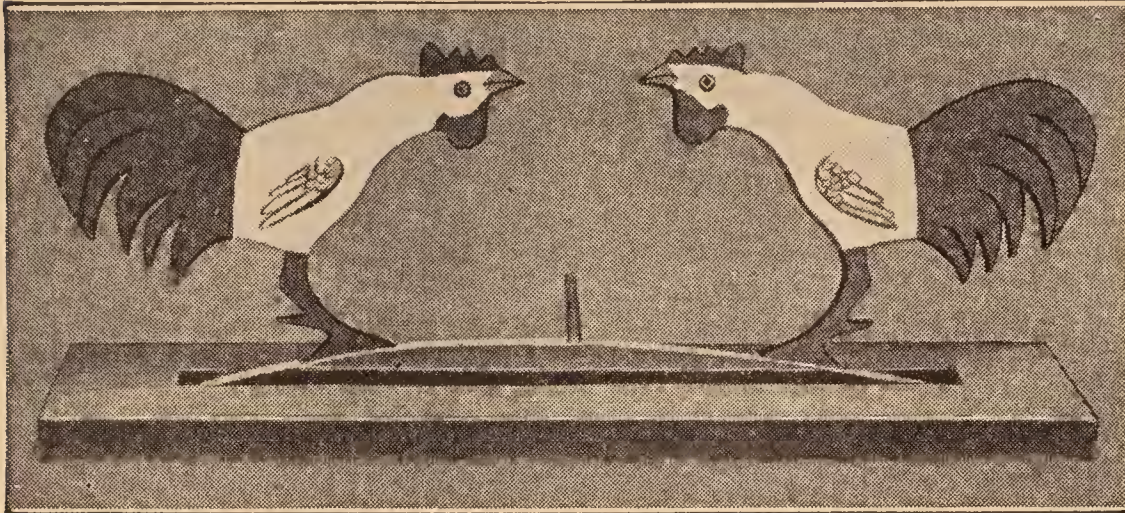
photograph. Remove the balance wheel, which leaves four gears besides the main-spring gear; cut a spool in half and secure it tightly to the shaft from which the hands were removed, to form the driving pulley. The front-axle support is a block of wood, tightly fitted between the spacing rods which hold the side plates together. The front axle is made from a round stick, and the front wheels are two checkers; the axle is held to the support by a small tin strap. The rear-axle support is a wood block, cut to fit between the side plates and held by small brads through openings in the plate, as shown. The block rests against the bottom of one of the spacing rods and no other fastening is required. Tin straps are used for securing the rear axle, which is $\frac{3}{8}$ in. in diameter, to the block. An old spool, cut in half, forms the rear wheels, which are tightly fitted to the axle; to secure traction, small brads are driven into the rim of the wheels and cut off about $\frac{1}{8}$ in. from it. The rear wheel on the same side as the drive pulley is grooved to take a string belt, which transmits the energy of the clock mechanism to the wheels.—Chas. Brocksmith, Bicknell, Ind.

Emergency Ear for Pail

Often, when the ear of an otherwise good pail breaks, its usefulness is somewhat limited. A satisfactory repair can be made by flattening out a window shade-roller bracket and riveting it to the pail.—Forrest Benson, Boulder, Colo.

The Fighting Roosters

The younger child will get a great deal of pleasure, and may occupy long periods of time, in playing with the toy shown in the photograph, a toy which is simple to make, and not apt to get out of order easily.



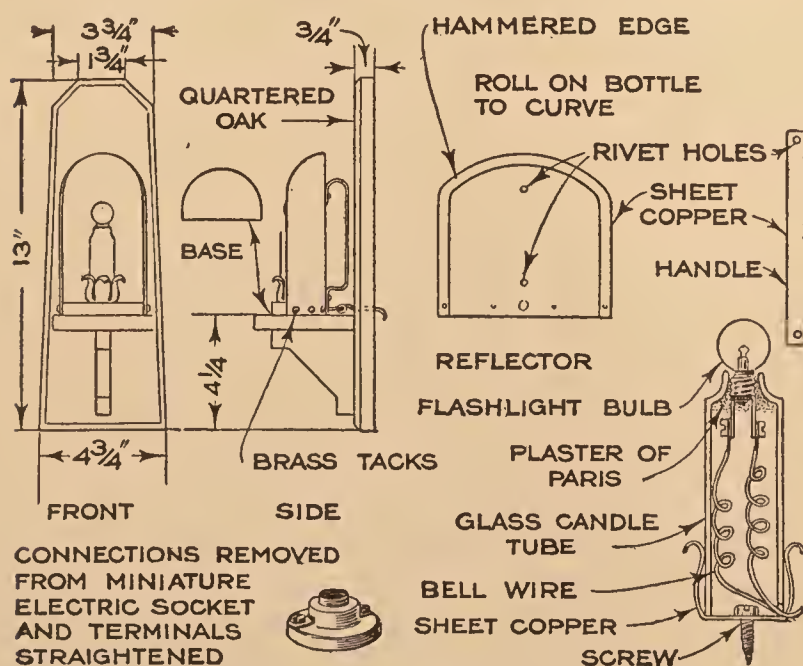
Two Wooden Roosters Mounted on a Piece of Spring Steel Afford a Comical and Perfectly Safe Toy for the Amusement of the Child

Two roosters are cut out of thin wood or heavy composition board, and are painted in the manner illustrated. The feet of the roosters are fastened to a piece of thin spring steel by driving a tack or brad through a hole in the steel into the wood. The spring is then set into a base somewhat like the one shown, the ends being held so that the steel bends slightly upward in the middle. Finally a wooden pin is fastened to the middle of the spring by the same method as described above. By pressing on the top of this wooden pin the roosters are made to swing back and forth, thus giving a pretty good imitation of the belligerent barnyard fowls.

Electric Candle Sconce

The electric candle sconce shown in the drawing enabled a storekeeper who had become partly deaf to enjoy the comforts of his private rooms while at the same time attending to the store, which was connected with his home.

The sconce will require a glass candle tube, which can be obtained from electric shops, and a miniature bulb, the two being combined as shown in the drawing. The metal parts are removed from the porcelain base, and the terminals are straightened parallel with the socket. The wires are attached and the socket is fastened inside the candle tube with plaster of Paris or melted sealing wax. The candle tube is held to its semicircular



A Deaf Storekeeper Made This Electric Sconce Which Lights When the Door of His Store is Opened

wooden base in a socket, or "husk," cut from a single piece of flat metal and bent into the shape shown. It is attached to the base with a screw.

The completed sconce was placed in a conspicuous place on the wall and connected to the door trip, so that each time the door was opened the light flashed on; three wet cells were used to furnish current. By connecting the sconce to a bell-ringing transformer it becomes very useful in the bedroom, as it provides sufficient illumination without disturbing anyone who may be sleeping.—Chester Disque, Covington, Ky.

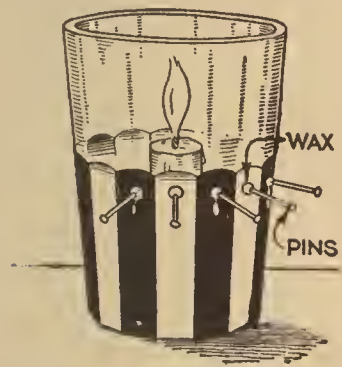
Umbrella Makes Folding Minnow Net

A party of campers overlooked their minnow net. The oversight not being discovered until their arrival at the camp site, a satisfactory substitute was made from an old umbrella frame and some ordinary mosquito netting. The wire holding the ends of the rib braces to the small metal ferrule, which slides on the umbrella shaft, was cut, and the braces were pulled free of the ferrule. A piece of mosquito netting with a small hole cut in the center was slipped over the handle. The rib braces were held upright and the netting was pushed over them, one at a time. Applying the netting as described, it will rest on the underside of the ribs and will have no large holes if care is used in pushing the braces through the netting. After the netting has been fitted over each rib brace, their ends are again wired to the

ferrule. A piece of stout string is tied around the outer edge of the ribs, a half hitch being taken around the end of each rib, to prevent their spreading. When the ribs were secured as described, the edge of the netting was turned over and sewed to the string and also to the separate ribs, so the netting would retain its shape. Applying the netting in this manner, the net can be opened and closed as an ordinary umbrella. For catching minnows in deep water, a pole was attached to the umbrella handle.—Dale R. Van Horn, Lincoln, Neb.

Relative Absorption of Heat by Colors

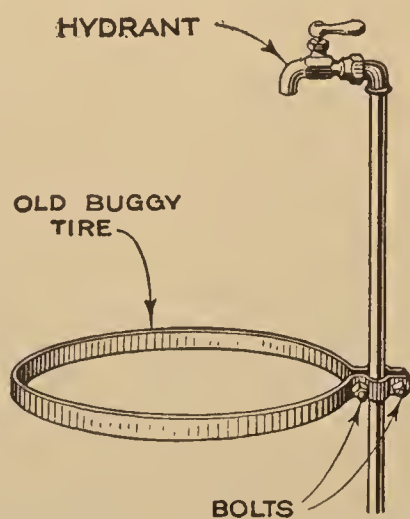
An easy method of demonstrating the relative heat-absorbing power of black and white, as well as other colors, is provided in this experiment. Black and white stripes are painted around the outside of an ordinary water tumbler. Small lumps of wax are softened and placed on the painted strips, and pins are pushed into



the wax, as shown in the drawing. A short length of candle is lighted and placed inside the tumbler; after a few minutes it will be observed that the wax on the black strips begins to soften, and that the pins on these strips fall down, on account of the large amount of heat absorbed.—S. Leonard Bastin, Bourne-mouth, Eng.

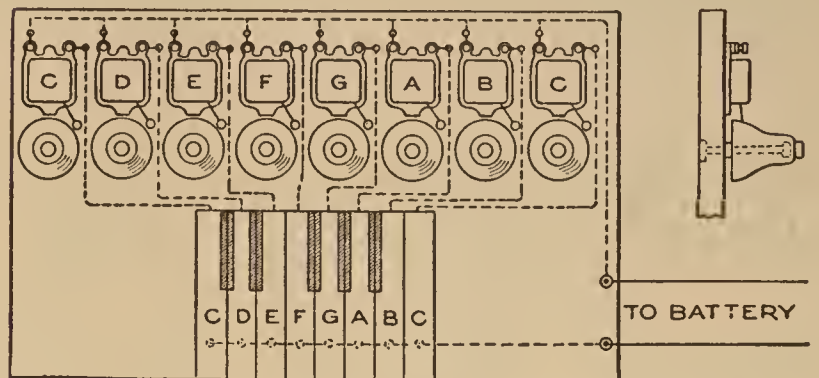
Basin Holder on Hydrant

Where water is drawn from an outdoor hydrant, for washing purposes, it is the usual practice to fill the basin and carry it some distance to a box, bench, or other support. By the use of a basin holder, such as shown in the drawing, the washing can be done right at the hydrant. The frame, or holder, is made from a piece of an old buggy tire, the ends being formed to clamp around the pipe. Holes are drilled at each side of the clamp to receive short bolts, by means of which the holder is clamped to the hydrant pipe.—H. F. Grinstead, Columbia, Mo.



Drummer Uses Electric Chimes

The ordinary orchestra bells, used by drummers in dance orchestras, require the



The Electric Chimes are Played with the Fingers of One Hand Operating the Keyboard, Which may be Made of Wood, or Taken from a Toy Piano

use of both hands in playing them, unless the "roll" effect is dispensed with. By the use of an arrangement of chimes, electromagnets, and a toy-piano keyboard, an apparatus was rigged up which, besides giving a better and clearer sound, could be played effectively with one hand, leaving the other free to manipulate other "traps." The chimes may be obtained from a music store at a moderate price, and they are mounted in a row, as shown. Eight of them are sufficient if they are to be used when playing in only one key, and if one octave is considered sufficient range. The chimes should then have the pitch indicated by the letters in the drawing, the lowest being middle C. The electromagnet and tapper from an electric doorbell is mounted near each of the chimes, the tapper being placed the same distance from the edge of the chime as it was from the bell. The keys were taken from a toy piano, and mounted on a board so as to be in reality eight different switches; pieces of spring brass being fastened to the underside of each of the keys, so as to make contact, when depressed, with the screws in the board.

If a better instrument is desired, the chimes for the chromatic tones may be added, and the range extended to an octave and a half, or 20 chimes instead of eight; this will then cover the range of nearly all popular music. Beautiful effects can be obtained by playing two or even three chimes at once, just as done on the piano. Most drummers soon learn to "fake" other notes to harmonize with the melody, so that two fingers may be used on the instrument continuously.

❏ Never fill a gasoline torch more than three-quarters full, and it will be found that the torch will last much longer without the necessity of repairs.

Revolution Counter Useful in Coil Winding

A small revolution counter, or speed indicator, attached to the winding jig, as suggested in the drawings, makes accuracy certain in counting the number of turns when winding electric coils.

As the lathe is usually used for medium and heavy coil winding, Fig. 1 shows how the counter may be attached to a wooden

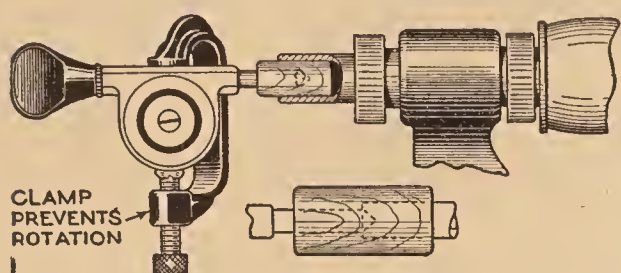


FIG. 1: REVOLUTION COUNTER PLUGGED IN REAR END OF LATHE SPINDLE

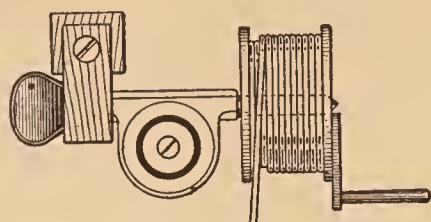


FIG. 2: SMALL BOBBIN DRIVEN DIRECTLY ON COUNTER SPINDLE, TURNED BY HAND

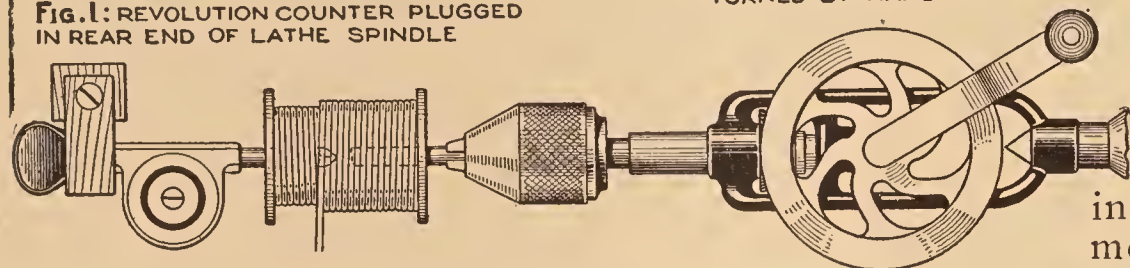


FIG. 3: WINDING MANDREL ON HAND DRILL, BOTH DRILL AND COUNTER CLAMPED TO BENCH

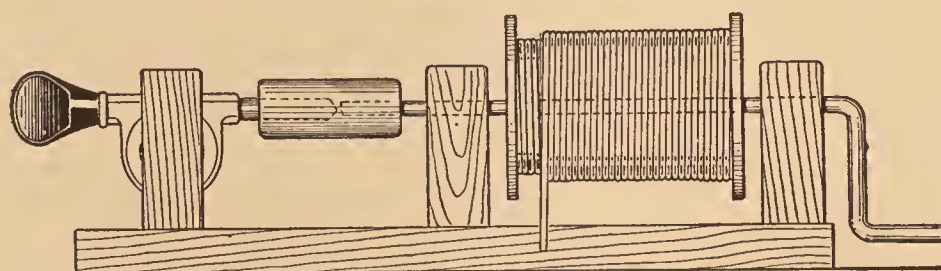


FIG. 4: ATTACHED TO WOODEN WINDING JIG

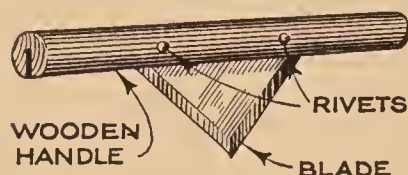
Various Arrangements are Illustrated by Which an Ordinary Speed Indicator, or "Revolution Counter," may be Used to Keep Accurate Count of the Turns of Wire When Winding Coils

bushing driven into the hollow lathe spindle. If the spindle hole is not large enough, or not hollow, a wooden coupling can be fitted over the spindle instead of into it, as in the detail. If the counter is in good working order, there should be no tendency for it to rotate with the lathe spindle; if it does, a small clamp will act as ballast, as indicated. When a lathe is not available, hand turning must be resorted to. Figure 2 shows an extremely

simple rig for fine-wire coils; the spool is driven directly on the counter spindle. The counter may be clamped in a vise or to a bench, and a handle is fastened to the spool, for turning by hand. To speed up the winding, a hand drill with the spool held in the chuck is frequently used, the drill being clamped down or held in a vise. Such an arrangement is shown in Fig. 3. While the counter is usually clamped to the bench, the same as the drill, it may be allowed to swing free, as suggested in Fig. 1. In Fig. 4 is shown a simple type of winding jig, rotated by a crank handle, while the counter is attached through a hardwood coupling to the other end of the winding shaft; a wood post keeps it from turning.

Can Opener for Large Cans

For opening large cans, such as the square 5-gal. variety, in which paint and



other liquid and semiliquid commodities are shipped, a can opener, such as that shown in the drawing, will be found very effective and a great timesaver where the cans to be opened are all square. A piece of thin, hard steel, such as an old saw

blade, is cut into a triangular blade. Holes are drilled in the top edge, and a wooden handle, made from a piece of round wood, is riveted to the blade. The blade is filed

sharp on its two outer edges and with it the tops can be cut from large or small cans with ease.—Washington S. Morton, Pasadena, Calif.

A Celluloid Squeegee Plate

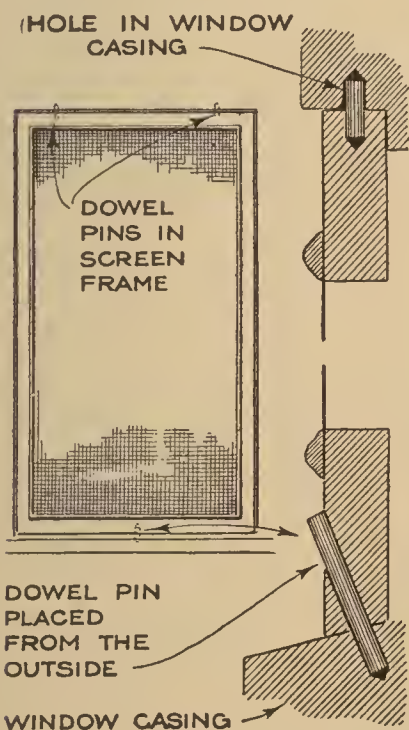
Sheets of celluloid, like that used for windows in automobile curtains, can be used in place of ferrotype plates for obtaining a high-gloss finish on glossy-surfaced paper. Clean the surface of the celluloid and give it a coat of furniture wax; after it has dried for a few minutes, polish the surface and place the wet prints, face down, against the polished side. With a squeegee roller force the water and air bubbles from under the prints, so that the surface of the paper is in contact with the celluloid. The plates are then stood on edge in a dry place. When dry, the prints will peel off the celluloid and have a pleasing glossy finish.

Curing a "Grabbing" Automobile Clutch

A motor car whose clutch persistently "grabbed" was cured by the owner in a simple manner. He powdered a piece of sandstone, about the size of a walnut, and sifted the sand through fine cloth onto a piece of paper; he then dropped small piles of sand on the clutch facing, at 2-in. intervals, dropping in the clutch carefully each time, to bed the sand into the leather. This operation was repeated several times, and the results were a revelation. This treatment, however, is one that should not be applied except in extreme emergency, as the inside of the flywheel is likely to become scored and its diameter reduced from the abrasive action of the sand, and this would only aggravate the trouble.—J. Lewis Llewellyn, Sydney, Australia.

Dowel Pins Make Firm Screen Fastenings

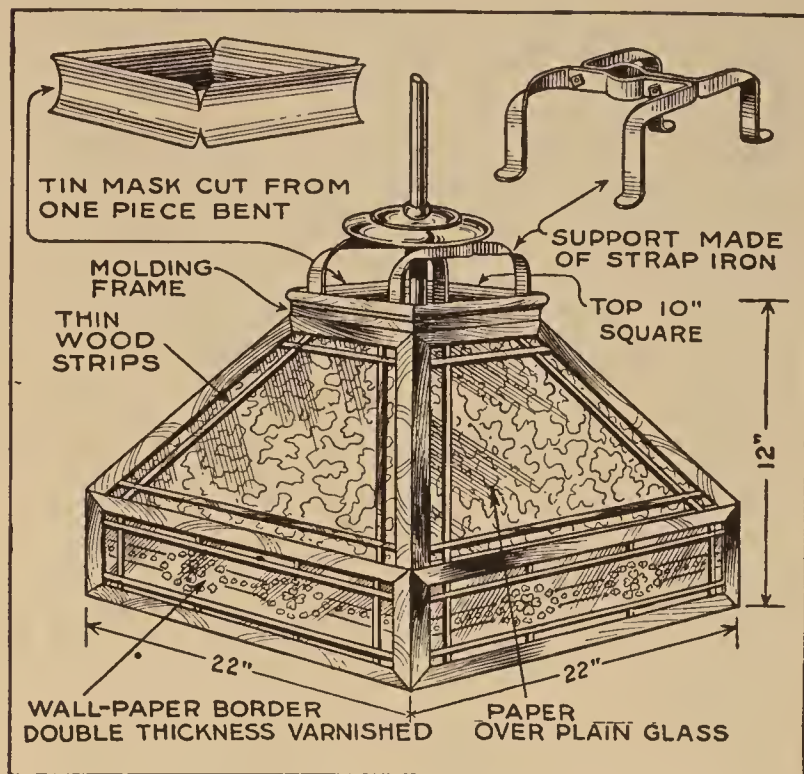
Window screens which are held in place in the window frames with dowel pins cannot rattle in the wind if well fitted, and as there is an entire absence of metal parts and screws, there are no parts to rust. As shown in the drawing, wooden dowels are driven into drilled holes on the upper end of the screen frame; the projecting ends of these dowels fit into holes drilled in the window casing. When the screens have been set in place they are prevented from falling out by another dowel, inserted into a hole drilled at an angle through the bottom of the screen and window casing, as indicated. By removing the bottom dowel, the screens can be easily taken out, and as easily replaced.



Homemade Lamp Shade Imitates Stained Glass

An attractive lamp shade for the dining room, library, or parlor, can be made at slight cost for the small amount of picture-frame molding, glass, paper, and varnish required. The frame of the lamp

is made from plain molding, and its construction will constitute a test of the



A Variety of Attractive and Harmonious Effects in Lamp Shades are Obtained by Using Varnished Wall Paper in Imitation of Stained Glass

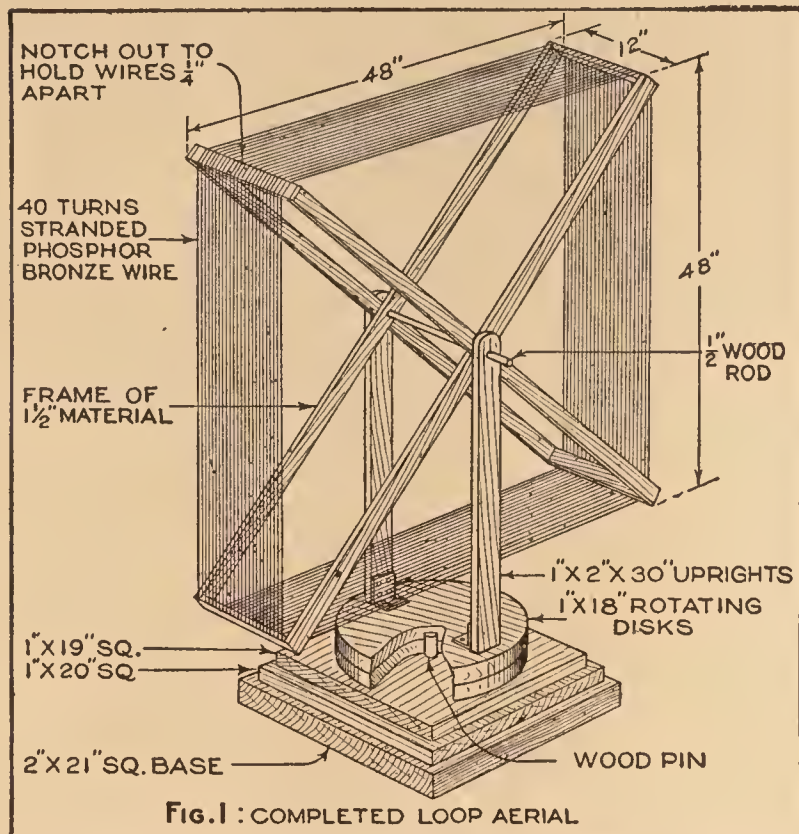
worker's skill at making mitred joints. If the shade is to be used with a gas lamp, a tin mask, such as that shown, should be fitted inside the top, to protect the woodwork against the heat. The sloping panels are filled with clear glass which is held in place by small brads, or glaziers' points, underneath; these panels are covered, on the outside, with one or more thicknesses of ornamental wall paper, or paper colored to imitate stained glass. The sheets of paper should be varnished and evenly pressed against the glass to dry; the varnish makes the paper adhere to the glass, rendering it more or less translucent, and heightening the effect of stained glass. The bottom panels require no glass and are filled with two thicknesses of wall-paper border, each sheet of paper being applied separately. Dampen the first piece slightly and paste the edges to the frame; when dry, the first sheet is varnished and the second piece is applied over the wet varnish, so that the design on both pieces "registers." The best variety of wall paper for this purpose is the so-called "engraved" kind, which is obtainable from most dealers. Thin wood strips are used, in the manner shown, to relieve the blankness of the panels. A simple support, as illustrated, is used for holding the shade to the fixture, the shade resting on the arms.—F. E. Leitch, Brooklyn, N. Y.

☞ Chloroform will remove dried paint from cloth; fresh paint can be removed by turpentine, or alcohol.

Design of a Loop Aerial with Tested Circuits

BY F. L. BRITTON

THE loop form of aerial does away with all other forms of receiving antennæ and opens a new field for the amateur. No tuning device is necessary, as the loop



The Loop Form of Aerial: No Tuning Device Is Necessary as the Loop Acts for Itself in This Respect

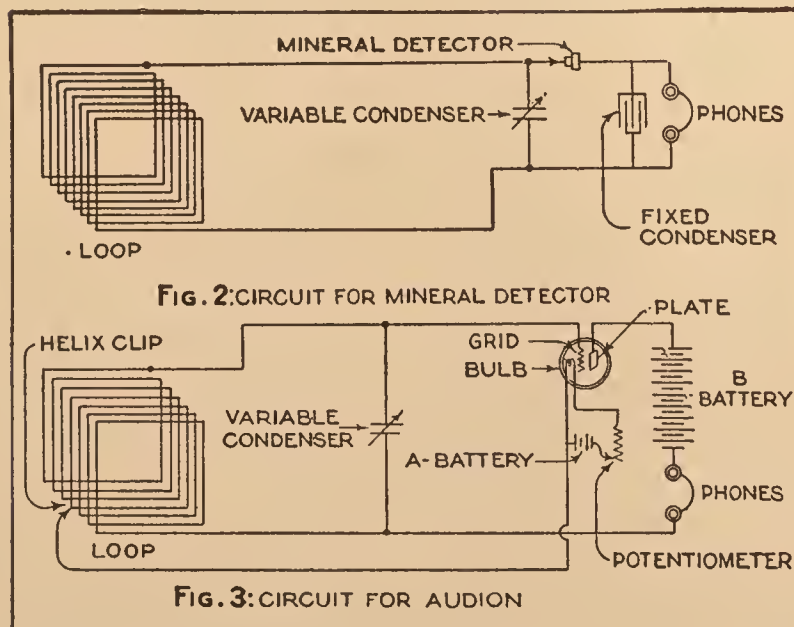
acts for itself in this respect. With a simple 4-ft. loop, such as the one shown in Fig. 1, wound with 40 turns of wire spaced $\frac{1}{4}$ in. apart, it is possible to receive signals from European stations. Amateurs in the central states have received readable signals from the English station "MUU," at Carnarvon, Wales, and also from "YN," the French station at Lyons, using a one-step amplifier in the circuit; these signals were very distinct.

The loop is easy to make and need not occupy any space at the operator's table, as it can be placed under the bed, or sus-

pended from the ceiling, if desired. The square, shown in Fig. 1, is the best design. The X-frame and the supporting uprights should be made of hard wood, for durability; a wood rod is used to support the loop between the uprights, as it is desirable to use as little metal in the construction as possible. The uprights are attached to a wooden disk so that the loop can be revolved for directional effects; a wood pin is countersunk and secured to the upper disk with glue. A hole is drilled through the lower disk, attached to the base, to receive this pin, as shown in the drawing.

The wire used for the clockwise winding of the loop is stranded phosphor bronze, although it has been found that No. 22 gauge enameled wire gives good results. Space the turns $\frac{1}{4}$ in. apart, and cut small notches at the corners of the frame, to keep the wires from slipping out of place. Stain and polish the woodwork of the apparatus to correspond with that of the station.

Figure 2 gives the circuit for using the mineral detector, which gives good results for short distances, the audion circuit shown in Fig. 3 being, of course, more efficient. These circuits work well, and while other circuits have been suggested, it will be found that best results will be obtained by using one of those shown. One lead, as indicated in Fig. 3, is soldered to a snap, or helix clip, and can be adjusted to any number of turns on the loop, as needed for various wave lengths. If the builder wishes, he can arrange a panel, to take the audion circuit, and mount on it a switch with the leads going to the various turns of the loop, which saves time and adds to the appearance of the station.



The Two Most Satisfactory Circuits for Use with the Loop Aerial When Operated in Connection with a Mineral Detector, or the More Efficient Audion

Making Flexible Mirrors

Flexible and unbreakable mirrors, that may be used for amusement or for more practical purposes, are made by silvering one side of a piece of transparent celluloid. Old photograph films may be used, but the emulsion with which they are coated must first be removed.

Dissolve $\frac{1}{4}$ teaspoonful of white gelatin in $\frac{1}{2}$ cupful of boiling water and allow to cool. Obtain a piece of tin foil, not lead foil; rub a few drops of metallic mercury, or quicksilver, on one side until a mirror-like shine results. Next, prepare the celluloid by wetting the fingers in the gelatin solution and coat one side of the celluloid,

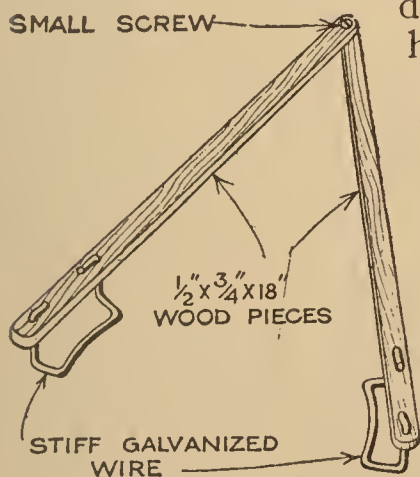
rubbing well until it is thoroughly coated with the gelatine sizing; upon this lay the tin foil, bright side down. Cover the tin foil with a piece of paper, held tightly to prevent slipping, and rub with some hard, round object until the foil is thoroughly attached to the celluloid. When the gelatine has set and become dry, a flexible mirror is the result. While care should be taken not to bend the mirror too sharply, for fear of wrinkling the foil and spoiling the effect, it may be twisted into almost any form.—J. G. Allshouse, Vandergrift, Pennsylvania.

Developing Two Films at Once

Two films may be developed at the same time by the tray method if the films are of the same size, with a consequent saving in time and chemicals. The films are unrolled and placed back to back. The ends may be secured with paper clips, or held in the fingers, and the development proceeded with in the usual manner. Care must be taken to avoid the presence of grit in the bottom of the tray, or the bottom film will become scratched. A long film may be doubled in the center, and developed in the same manner, but care will be required to prevent scratching the surface at the middle, where the film is bent.—Frederick C. Davis, St. Joseph, Mo.

Lifter for Hot Pie Pans

A convenient device for placing pies in, or removing them from, the oven, is made from two wooden strips, as shown in the drawing. Two small holes are drilled 5 in. apart and $\frac{1}{2}$ in. from the end of each piece, to take the pieces of stiff galvanized wire which are bent into the shape illustrated. The wires should fit the holes tightly, and the protruding ends are bent over against the stick. When the wires have been placed, a hole is drilled, about $\frac{1}{2}$ in. from the other end of each piece, for a small bolt, which holds the handles in place. The bolt should not be screwed too tight, as the handles must open and close freely. To lift the pie pan, the wires are placed under the rim of the plate and the handles are squeezed together, like a pair of pliers.



Exhibiting Cut Flowers in a Frame

At a recent flower show, a new and unusual way of displaying the blossoms



A Flower "Picture" That is Made by Displaying Cut Flowers in a Picture Frame, against a Contrasting Background of Colored Velvet

attracted a great deal of attention. A large gilt picture frame was used, the flowers being displayed against a contrasting background of colored velvet. The velvet was backed with a piece of wallboard, or stiff cardboard, and a light tin vessel placed near the bottom for the stems of the flowers; this was effectively concealed. Invisible holders were used to keep the flowers in position against the background, and the picture of the living blossoms was displayed on the wall. The designer has found this a popular arrangement when a novelty is wanted for social functions at private homes, and the scheme is one that can be readily adopted by anyone able to get fresh flowers.—E. I. Farrington, Weymouth Heights, Mass.

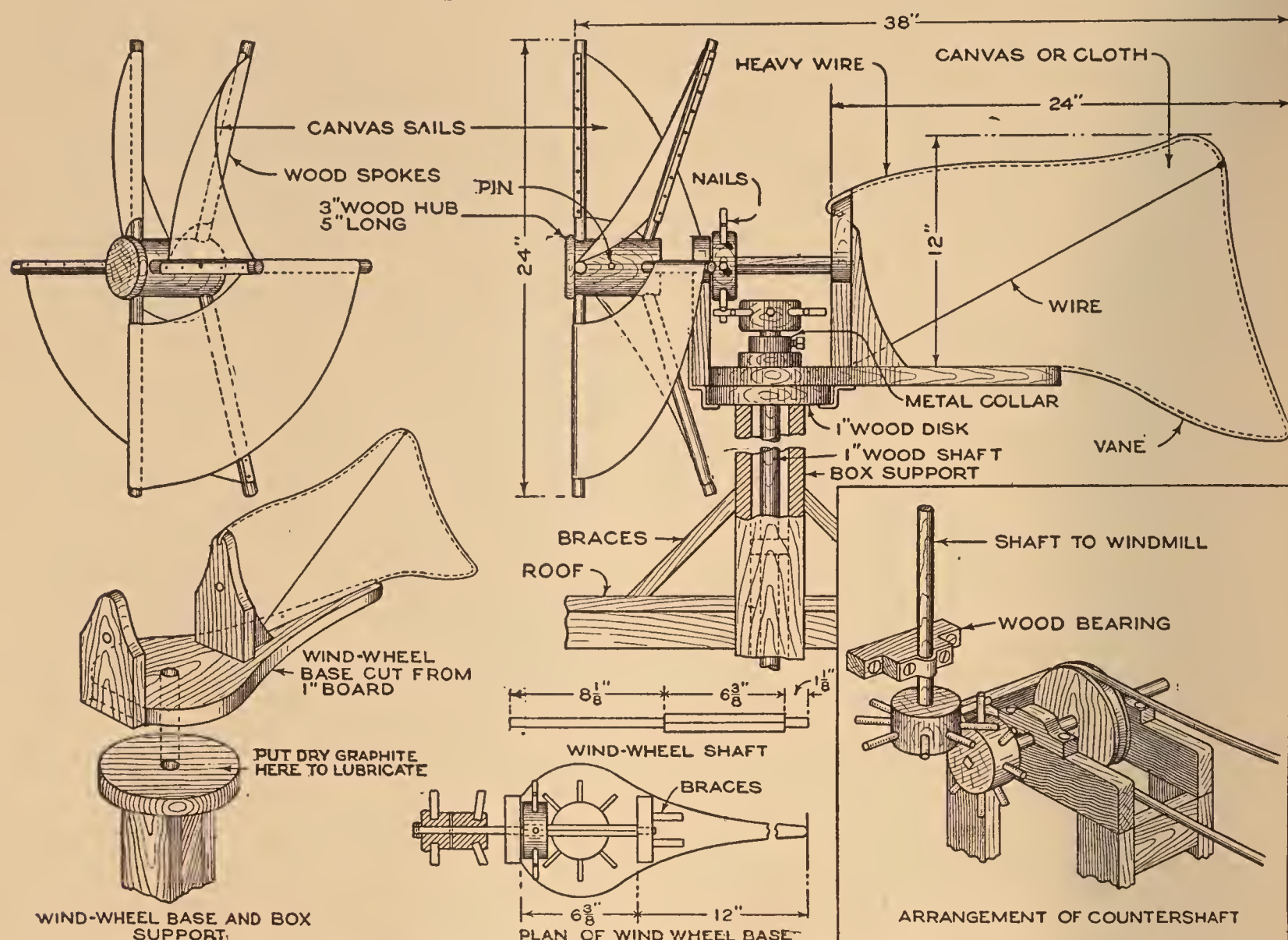
"Noise Absorbers" for Lawn Mowers

The nerve-racking noise produced when wheeling a lawn mower over paved walks, as is often necessary when taking the implement to the shop for sharpening or repairs, can be effectively silenced by equipping the wheels with rubber tires. Such tires are made from two sections of a discarded inner tube, each slightly wider than the rim of the wheel.—G. E. Hendrickson, Argyle, Wis.

Windmill Power Plant for the Amateur's Workshop

BY FRANK E. LEITCH

COMPARATIVELY few amateur mechanics have their shops equipped with similar machines. All parts of the mill are of such simple construction that little or



Constructional Details of the Windmill Power Plant: Such a Plant Is Capable of Operating Light Lathes and Similar Machinery. Besides, It can be Used for Operating Such Things as Churns and Ice-Cream Freezers on the Farm, Where Its Assistance Is Particularly Desirable

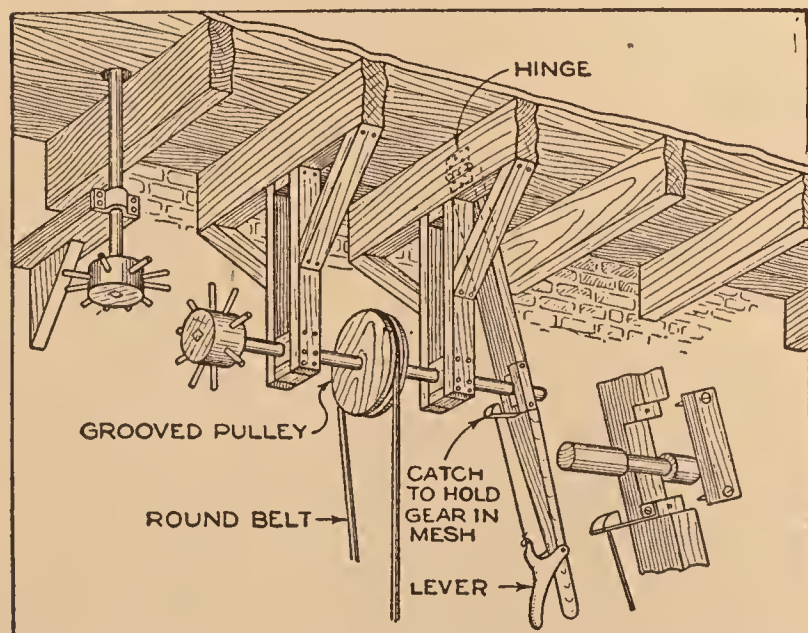
with any device for operating light machinery by power, and many others have forgone the pleasure of such machines and tools on account of their lack of power. This article describes and illus-

no difficulty should be encountered in its making.

The wind wheel proper is simplicity itself, consisting of a wooden cylinder into which eight wooden spokes are driven. The canvas sails are attached to the spokes in the manner indicated, and given a coat of varnish. A hole is bored through the wooden cylinder to take the rounded end of the shaft, a pin serving to hold the two together.

One-inch boards are used for the wind-wheel base and its box support, as indicated, the vertical pieces of the base being drilled to accommodate the wind-wheel shaft. A simple gear, having a square hole through its center, is secured to the square end of the shaft; this gear consists of a wooden disk of suitable size in the circumference of which headless nails, evenly spaced, are inserted.

The vane, which holds the wheel to the wind, is made by sewing canvas over a stiff-wire frame, and varnishing the same as the canvas sails. The wind-wheel base rests and revolves on a wooden disk



A Simple Gear Shifter for Starting or Stopping the Machinery Driven by the Windmill Power Plant

trates a windmill that will deliver sufficient power to drive light lathes and simi-

nailed to the top of the box support, plenty of dry graphite being used between the two surfaces to lubricate them.

The vertical shaft has mounted at its upper end a gear similar to that on the wind-wheel shaft, with which it meshes, as indicated in the drawing. A metal collar and setscrew serve to keep the two gears in mesh. The power of the windmill is transmitted to the machinery, underneath, by another set of gears in the manner shown in the insert.

For starting and stopping the machinery, a simple gear shifter is provided, as shown in the smaller drawing. A wide groove is cut in the shaft over which the gear-shifting lever is fitted, as indicated.

Filtered Oil in the Automobile

With a view to making a somewhat convincing trial of the durability of lubricating oil in an automobile engine, from the standpoint of using the same oil continuously, I started out with a brand-new, medium-priced, but good, car. I used the highest-grade, paraffin-base, eastern oil that I could find. I first washed out the crankcase with new oil, and then put in a charge of new oil, systematically changing the charge about every 250 or 300 miles, running the oil through a separate filter. The second charge was also new oil. From then on I used nothing but filtered oil, replenishing only that which burnt away in the combustion chambers, or drained out through capillary action, incident to all automobile engines. When the car had run about 18,000 miles, during a period of three years, I had the engine taken apart by a first-class mechanic, not because it needed any attention, but for the purpose of noting results. The bearings, pins, etc., showed not the slightest sign of wear, and therefore no adjustment was possible. The cylinders, pistons, and rings showed most of the original machine marks, and compression was excellent. The crankcase was cleaner, if anything, than that of a brand-new engine.

The filter used was a galvanized-iron pan, with a cock at the bottom, about 12 by 18 in. by 3 in. deep. A tray was inserted about halfway up from the bottom, made of $\frac{1}{2}$ -in. mesh wire netting, on which was placed a sheet of ordinary blotting paper, folded up around the edges so as to hold oil, after the fashion of a filter paper in a funnel. A charge of oil—about a gallon—goes through this

To hold the gears in mesh while the machinery is in operation, a catch which engages the bottom of the shaft hanger is made, simple means being provided for releasing the catch so that the gear shifter can be moved.

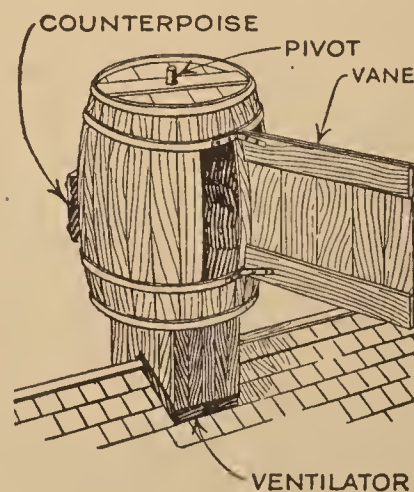
Of course, the operation of such a power plant is dependent entirely on the wind, but if there is any wind blowing, no matter from what direction, the windmill will operate. Such an apparatus can be arranged to drive such small machinery as churns and ice-cream freezers, and the speed can be regulated by varying the size of the driving and driven pulleys. The gears, however, for ease in construction, should all be of the same size.

filter in time to be ready for the next charge of oil in the engine. About 15 gal. of oil were used during this mileage, with 1 gal. now in the engine and another in the filter.

The use of good oil and a liberal amount of even unskilled attention are sure preventives of unnecessary repairs and excessive wear on parts, on whose satisfactory functioning depends the life of any automobile engine.—Fred D. Hood, Los Angeles, Calif.

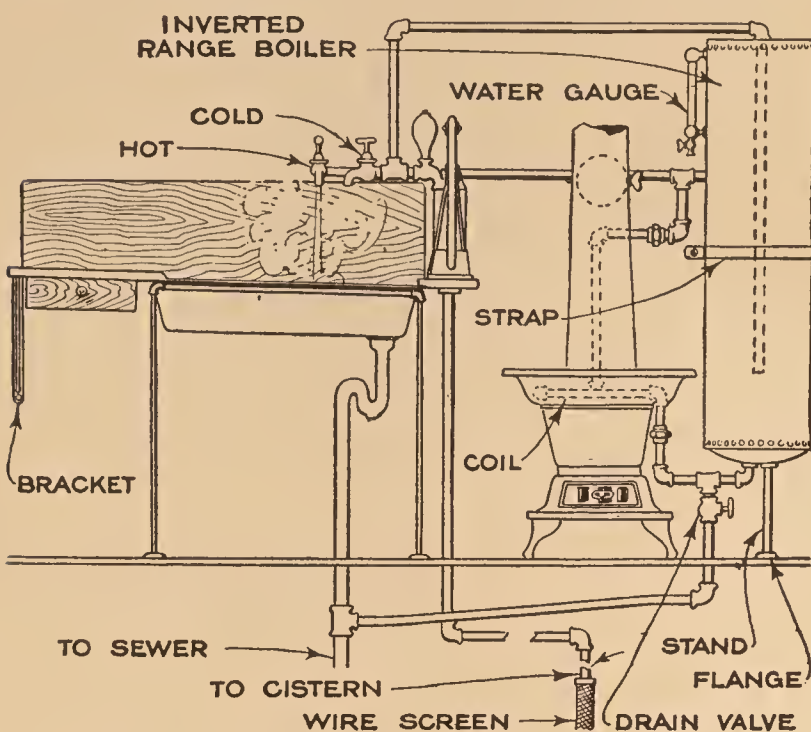
Ventilator Protected from Weather

In storage or drying houses, which require a great deal of ventilation, it often happens that rain, snow, and icy winds blow through the ventilating openings, doing more or less damage. The drawing shows how, in one case, an empty barrel was used to protect such an open ventilator. A vane of thin boards was attached to one side of the barrel, and a counterpoise was fastened to the opposite side. Several staves were cut out on each side of the vane, making large openings on that side of the barrel. One head was removed from the barrel, and a hole was bored in the center of the other; the barrel was then turned over the ventilator flue, a pivot in the top of the flue passing through the hole in the head. A washer and cotter pin underneath the head were used to keep the barrel in position and permit it to revolve freely.



Hot Rain-Water System for the Kitchen

The drawing shows a hot rain-water system, which can be installed at small cost. The pump used was originally



A Simple and Inexpensive System for Heating Rain Water from a Cistern: The Boiler is Attached to a Heater inside the Kitchen Range, Laundry Stove, or Furnace

equipped with a $\frac{3}{4}$ -in. compression hose bibb, or faucet. This was removed and a short nipple and tee substituted, the faucet being inserted into the tee; this arrangement leaves an opening for the $\frac{3}{4}$ -in. supply line which runs to the top of the range boiler, and inside it to within a foot of the bottom, as shown by the dotted lines. The water tank is inverted, to bring the two pipe openings, which are ordinarily at the top, underneath. One of these openings is used to take a stand, for supporting the tank from the floor. Such a stand consists of a length of pipe, which is closed with a plug, and an ordinary floor flange. One or more iron straps, secured to the wall, support the tank in position. A pipe from the second opening, in the bottom of the tank, leads to the heating coil inside the stove. The coil is made to meet individual requirements, from short lengths of pipe and elbows; the outlet pipe extends up inside the stovepipe about 16 in., and is then led out, being connected to the boiler and hot-water line by a tee.

It is not absolutely essential, but quite convenient to have a water gauge placed within a few inches of the top of the tank, to indicate the water level and prevent overfilling the tank. For draining the tank, and to clean it of sediment, a drain valve must be placed in the system at the lowest point, between the stove and the bottom of the tank, as shown.

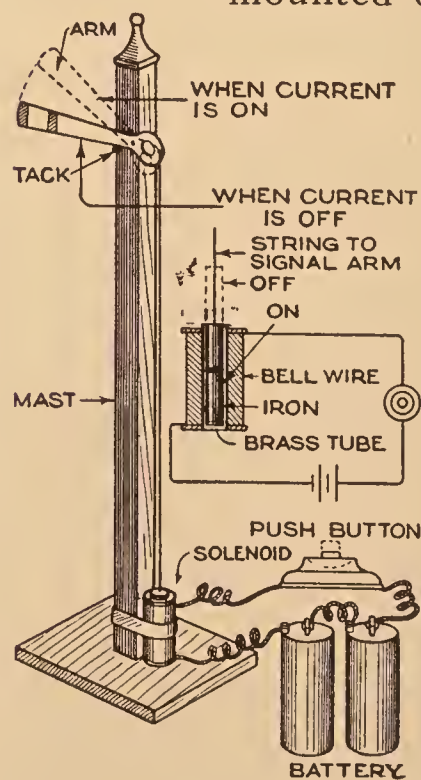
A good feature of such a system is that it can be drained to prevent freezing. By raising the pump handle to its limit, the plunger is forced down, lifting the valve in the bottom of the pump; this will cause the water to siphon back into the cistern and empty the tank to the level of the return bend. The remaining water, sediment, and dirt, is let out into a dry well, if no sewer is available, by opening the drain valve. A dry well, suitable for receiving the waste water from the sink, can be made by digging a hole, 7 or 8 ft. deep, and placing two headless barrels, one above the other, in it.—Carl L. Brandlein, Indianapolis, Ind.

Utilizing Old Shirts

Old shirts, that have become worn around the sleeves and neck, can be converted into satisfactory undershirts by cutting out the sleeves, including the arm-hole seam; the neck is also cut out to a comfortable depth and the cut edges hemmed.—H. M. Gallet, San Francisco, California.

Semaphore Signals for Toy Railway

With only a few simple and easily obtainable materials, a full set of electric semaphore signals can be built for the toy railroad. The semaphore mast is made of wood, while the arm may be of thin wood, cardboard, or metal. The mast is mounted on a small block, as

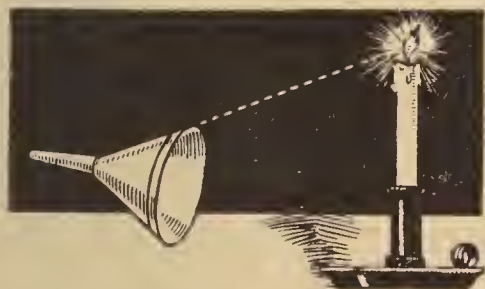


shown. The signal is operated by a solenoid, attached to the bottom of the mast with tape or a small metal clamp. The solenoid consists of several yards of bell wire, wound in a coil around a small brass tube. A light cord or thread is attached to the semaphore arm, and a small piece of iron or steel is attached to the opposite end and is dropped into the hollow core of the solenoid. The string should be just long enough so that when the arm is raised the metal on the string will be drawn entirely inside the coil. By connecting the ends of the coil to a dry bat-

tery and push button, the metal weight will be pulled to the bottom, and the semaphore arm will fly up in the "clear" position shown by the dotted lines; as soon as the current ceases to flow, the arm will drop into the horizontal, or "danger" position. An automatic block-signal system can be arranged by insulating sections of the track from others, and connecting the semaphores to the track circuit, so that as soon as the train enters that "block," or section, the signals will operate.—Chas. Zimmer, Hollis, N. Y.

A Candle and Funnel Experiment

Extinguishing the flame of a candle by blowing through the spout of a funnel appears to be a great deal easier than it really is. The attempt is made at a distance of about 2 ft. from the flame, and those not in the "know" will fail almost every time. The reason is this:

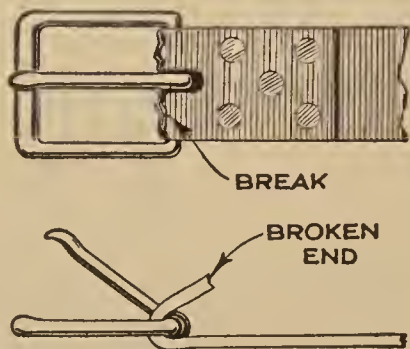


Naturally, the funnel is held so that the flame is in line with the spout, and this accounts for the

failure, as, when blowing into a funnel, the air follows the inner surface of the cone and avoids the axis. Not only is this so, but there is actually a back draft into the tube; this can be proved by holding the funnel close to the flame and blowing gently, when the flame will be drawn toward the experimenter by the inward current of air. The flame may be blown out immediately by pointing the outside of the cone toward it, in the manner shown in the drawing.

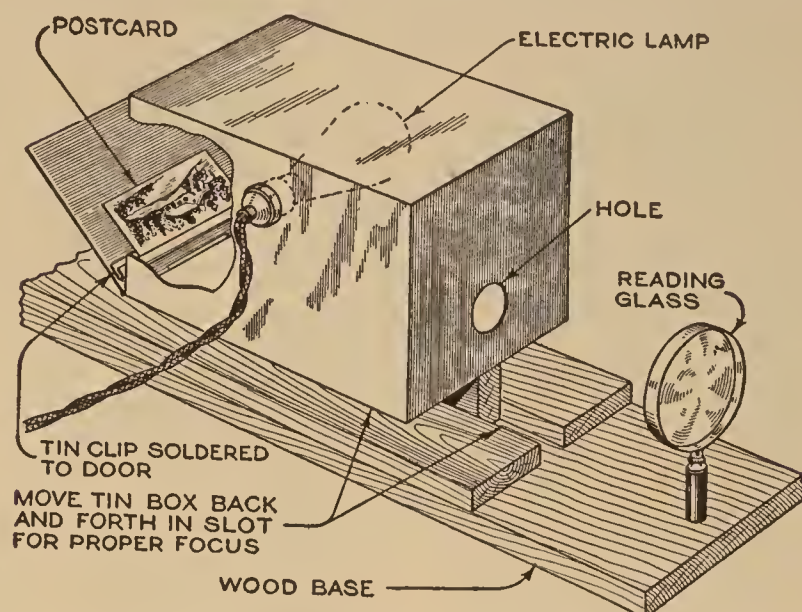
Buckle Strap Repaired Quickly

The buckle on a binder apron broke from the strap during the busiest part of the harvest. It was quickly repaired by cutting a hole in the strap about an inch from the end, large enough to admit the tongue of the buckle. The strap was then put through the buckle from the bottom and slipped over the tongue, so that the greater the pull exerted on the strap, the more securely it would hold. This repair was perfectly satisfactory.



A Postcard Projector

A simply constructed postcard projector that will throw the pictures from



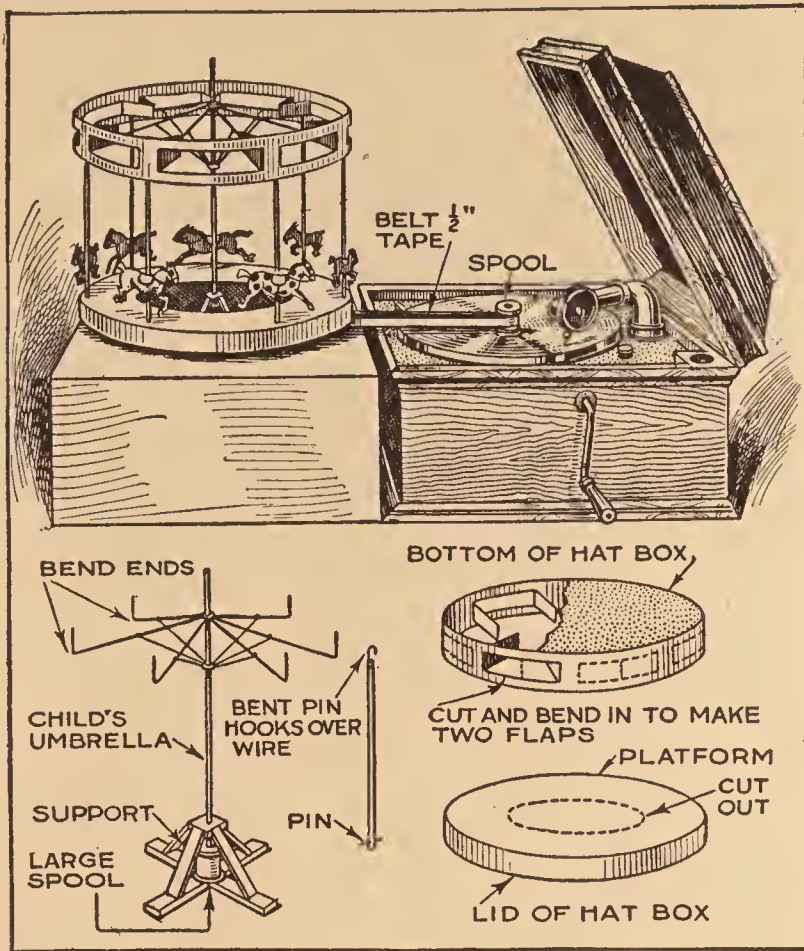
A Postcard Projector Made from a Tin Cracker Box That Throws the Pictures on Postcards, and Magazine and Newspaper Illustrations on a Screen

postcards, and magazine and newspaper illustrations, on a screen, is made from a tin cracker box. A round hole is cut in the bottom of the box, somewhat out of center, and another hole is cut at one side for the insertion of an electric lamp; this latter hole should be at such a height that the lamp will be well above the opening in the bottom, as indicated, and a metallic filament lamp should be used. A tin clip is soldered to the tin lid of the box, which should be hinged, for holding the pictures to be shown; care should be taken to locate this clip so that the center of the picture will be in line with the center of the hole at the front. A wooden base, with a groove in the center, is provided, and a strip of wood is nailed on the underside of the box to fit into it, so that the whole can be moved back and forth. The projection lens is an ordinary reading glass mounted at the front end of the base in line with the hole. The inside of the box should be brightly polished, as its successful operation depends largely upon the amount of light that is reflected onto the picture. In use, the light is turned on, the cover is lowered, and a picture is inserted in the clip, upside down; the cover is then closed, and the box is moved back and forth on the guides until the image on the screen is in focus.—Glenn O. Wilson, Denver, Colo.

¶ Before putting the roof on a poultry shed, let the roll of paper lie in the sun for a few hours. If this is done, there will be no ugly creases in it when the roofing is laid.

Toy Merry-Go-Round with Music

The toy merry-go-round shown in the drawing has most of the characteristics of



No Amusement Device Brings More Joy to the Children than the Merry-Go-Round, and This Toy Brings Clearly to Their Mind Past Pleasures They have Fully Enjoyed

the real thing; it "runs," has animals, and music. The music and operating power are furnished by the phonograph.

The handle of a child's umbrella is cut to a convenient length, and the ends of the ribs are bent up at the ends as shown. A simple wooden support is made, large enough to hold a good-sized spool. Holes are drilled in the top and bottom of this support, to accommodate the handle of the umbrella, which extends about $\frac{1}{2}$ in. below the spool pulley. The bottom end of the handle is slightly pointed, to make an easier bearing in the bottom hole of the support.

The upper part of the merry-go-round is made from the bottom of an old hat box. Oblong holes are cut in the sides, to allow two flaps to bend inward. These flaps are fastened to the umbrella ribs, by vertical slits cut in the ends. The hat-box lid, with a round piece cut from its center, forms the platform; this is suspended from the umbrella wires by slender sticks, each having a bent pin at the upper end, to hook over the wires. A pin is driven through the lower end of each stick, to support the platform. Animal pictures are cut out and glued to the sticks. The merry-go-round is elevated to the same level as the phonograph turntable. A

spool is fitted over the turntable spindle of the instrument, and a $\frac{1}{2}$ -in. tape belt is used to drive the merry-go-round, as shown in the illustration.

Shoe Polish for the Automobile

Common brown shoe paste makes a satisfactory and economical automobile polish, as it has been found that it not only removes spots and dirt, and produces a surface that is proof against finger prints, but has no affinity for dust. One can is enough for two "shines," if the polish is properly applied. The car is washed and dried in the usual manner, and the polish is applied with a piece of slightly dampened cloth. Apply a thin coat of the paste, with a circular motion, and, when it has dried, polish with a piece of dry cheesecloth, using a long, swinging motion. The polishing paste can also be used on the top, in the same manner.

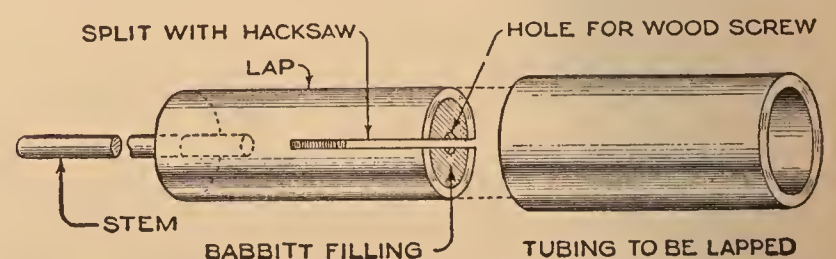
An Easily Made Dress Form

A serviceable and inexpensive dress form, for the woman who makes her own clothing, can be made, as shown in the engraving, from a French lining which is made to the exact fit of the wearer. The lining is tightly stuffed with excelsior and closed at top and bottom with wooden disks. The standard supporting the form extends through the body, the lower end of which is secured to a base made from an ordinary box with two crosspieces across the top. Ballast, in the form of two bricks, prevents the completed form from being easily upset.



Truing Up the Bore of Tubing

When a piece of drawn brass, or steel, tubing is used for such purposes as the cylinders of model engines, it is frequently found that the bore is not true but, if no lathe or reamer is available, as is usually



When a Lathe or Reamer Is Unavailable, the Bore of Drawn-Steel or Brass Tubing Intended for Experimental Purposes can be Trued by Lapping

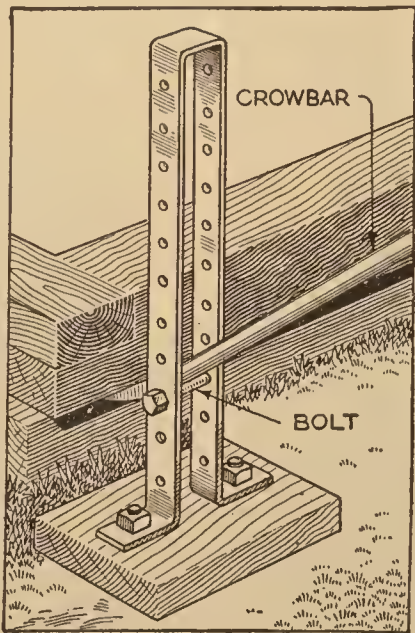
the case, it is still possible to true up the bore by lapping, using the tool shown in the drawing. The tool, or lap, as it is commonly called, is made from a piece of tubing that will just slide inside the tube to be trued; an iron rod, with one end roughened, is held in the lap so that it will not reach all the way through, and is secured by filling the lap with melted lead, or babbitt, as indicated in the drawing. In the end of the lap, opposite the rod, drill a hole for a wood screw, and with a hacksaw make a slit through the center of the hole, as shown. The tube to be trued, which is cut somewhat longer than required, is held in a vise, and the lap, which is held in the jaws of a hand drill or bit brace, supplied with valve-grinding compound, or other abrasive, is inserted. The lap is rotated and pulled back and forth; both the lap and the tube being trued will be cut away, and this wear is compensated for by inserting a wood-screw into the hole provided in the end of the tool and screwing it in until the tool has been expanded sufficiently. If a very fine, smooth finish is desired, use very fine abrasive and much oil, and, at the last, keep adding oil, but no abrasive; finish by lapping with oil and graphite, running the lap rather tight.

If no tube can be found to fit the tube to be lapped, make a lap from lead or babbitt, by pouring it into the tube to be trued after thickly smoking the inside with a candle, so the babbitt can be pushed out. The other details are the same as for the tool described.—Howard Greene, New York, N. Y.

Adjustable Crowbar Fulcrum

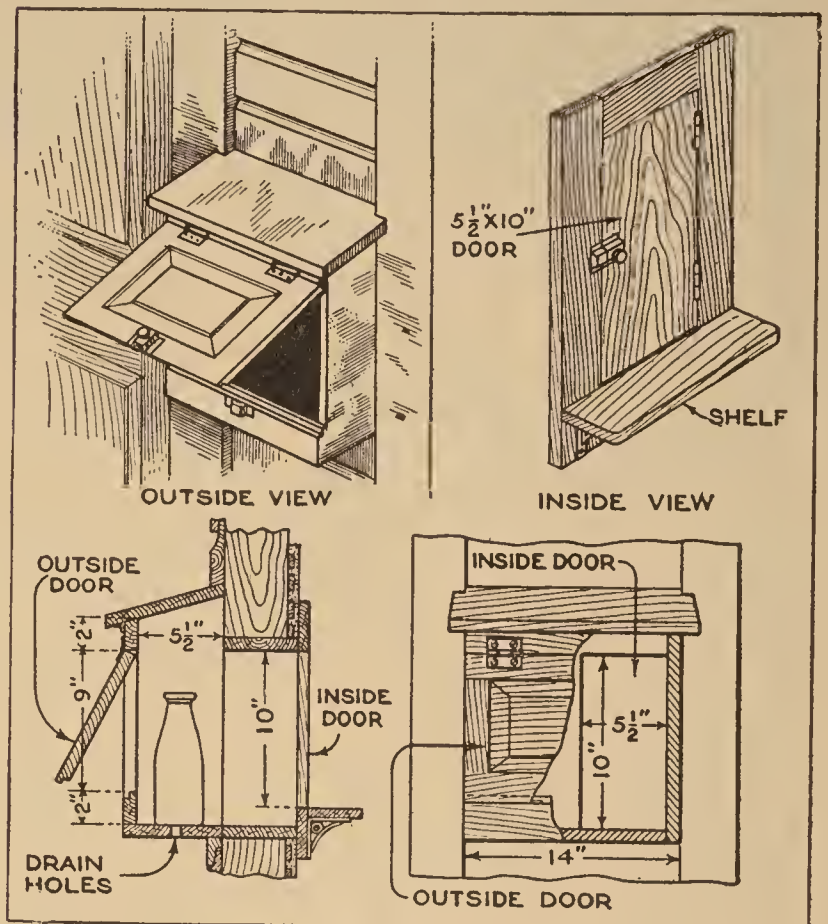
The drawing clearly shows the construction of an adjustable crowbar fulcrum made from a piece of old $\frac{1}{4}$ by $2\frac{1}{2}$ -in. flat iron.

The iron is bent into the shape shown, a space of about 2 in. being allowed between the sides. The feet, which are bent at right angles to the upright part, are drilled for attaching the device to a block with bolts. The sides are provided with holes at $2\frac{1}{2}$ -in. intervals through which the bolt supporting the crowbar is inserted.



A Box for Bread and Milk Deliveries

In addition to its convenience, the built-in box shown in the drawing protects deliveries of bread, milk, and other



A Box Built into the Wall of the House, at the Rear, Where Deliveries are Made, Protects Bread, Milk, and Other Foods from Damage and Contamination

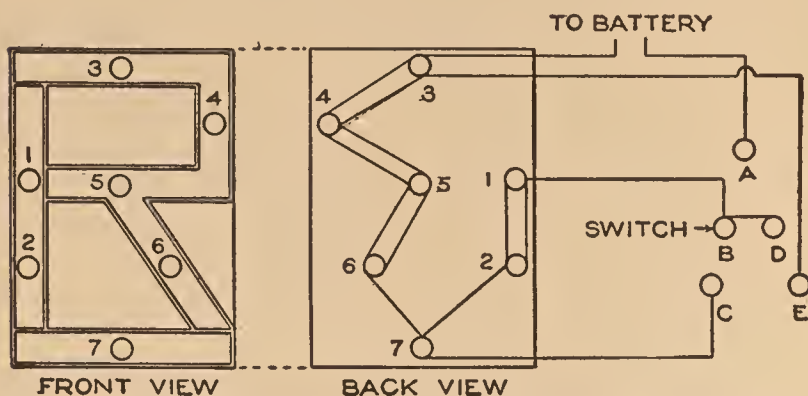
small packages from possible damage and contamination. Such a box is provided with both inner and outer doors and is best built between two studs at the rear entrance, where deliveries are usually made. After the articles have been placed in the box by the deliveryman, they can be removed from the inside without leaving the house. The box shown in the drawing is designed to hold two 1-qt. bottles of milk and a loaf of bread.—George F. Conrad, Germantown, Pa.

Vacuum Cleaner for the House Cat

An ordinary vacuum cleaner can be used to advantage in removing loose hair from Angora and Persian cats. The hair from the latter breed is so fine and downy that it cannot be easily removed from household draperies and cushions unless a vacuum sweeper is used. The suction from the cleaner is too strong to run over the cat's fur, but if the current is turned on and the sweeper held close to the animal while the hair is combed or brushed, all the loose hairs will be taken in by the suction of the machine. It is necessary to teach the cat to become acquainted with the sound of the cleaner, but after a few trials it will not be disturbed by the hum of the motor.

Automobile Direction Indicator

A direction indicator for automobiles, for use at night to show a following driver the intentions of the driver of the



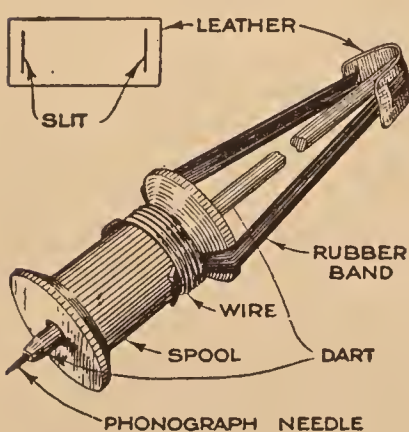
An Electrical Direction Indicator Which Shows the Driver of a Car Following the Intention of the Driver to Turn to the Right or Left

car, is easily made and attached to any car with an electric-lighting system. The indicator shown is an electrically illuminated combination of the letters "R" and "L," with a switch on the dash or on the steering wheel.

The letters are formed by troughs about 1 in. wide and $\frac{1}{8}$ in. deep, and painted white, to reflect the light from the small electric lamps which are mounted in them, as shown. The entire monogram should be about 3 by $4\frac{1}{2}$ in. When lamps 1, 2, and 7 are lighted, the "L" will be illuminated, and when lamps 1, 2, 3, 4, 5, and 6 are on, the "R" will appear; these results are obtained by throwing the switch lever to the right or left. The switch lever is fastened at A, and when thrown to the left, makes contact with B and C. By tracing out the circuit, it will be seen that this will light the "L." In the same manner, when the switch lever is thrown into contact with D and E, the "R" will be lighted.—Alton D. Spencer, Columbus, Ohio.

Spool Bow for Shooting Darts

A good substitute for a bow and arrows, and one that is much easier to make and use, is made from a large



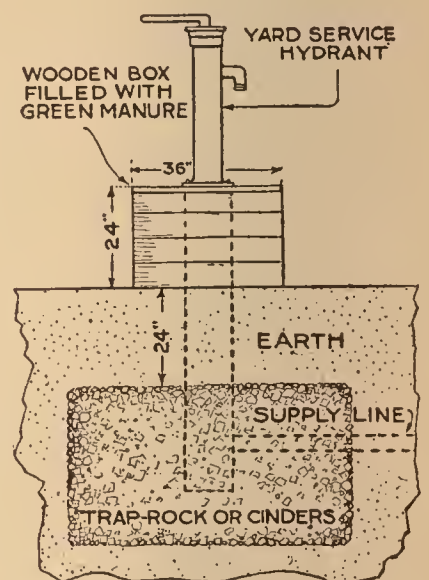
spool and a wide rubber band. The rubber band is cut in the center and a piece of leather, $\frac{1}{8}$ in. wider than the band, is slitted at each end. This piece of leather is slipped over the rubber band, as

shown in the drawing; then the ends of the band are bound to opposite sides of

Correct Installation of Yard Hydrants to Prevent Freezing

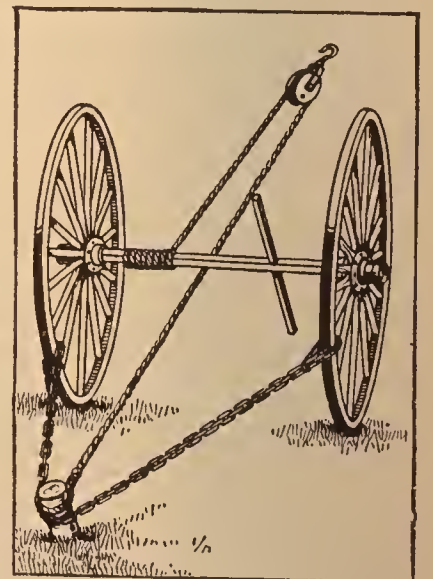
By using a little care in installing yard service hydrants, much subsequent trouble will be avoided; one of the commonest troubles is that of freezing.

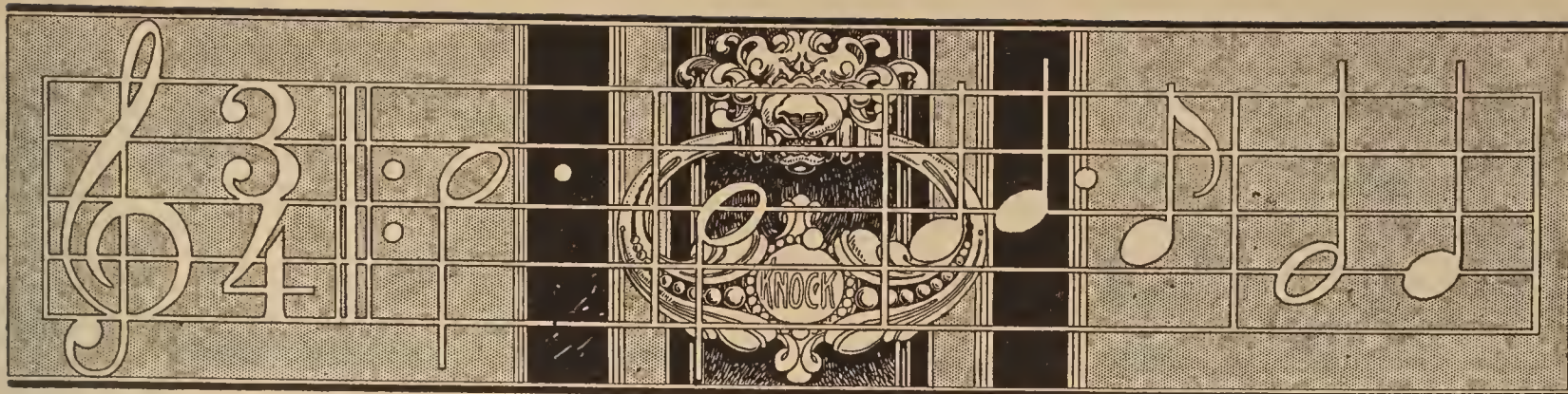
The illustration shows a method of installing a hydrant, which will eliminate "soggy" or wet spots around it, by providing a good drain for waste water. As the drawing shows, the hydrant is set in a basin of trap rock or cinders, which should occupy 8 or 10 cu. ft.; the flange of the hydrant casing is bolted to the top of a wooden box, 36 by 26 by 24 in. high, which may then be filled with green manure.



Wire Stretcher Made from Wagon Axle

Designed particularly for stretching wire fencing, the device shown in the drawing, which is made from the wheels and axle of an old buggy or wagon can be used for a variety of purposes around the farm. As indicated in the drawing, the wheels are firmly anchored, as well as one end of the rope, the other end being secured to the axle, which takes the place of a windlass drum. A hole is drilled through the axle at some convenient location and an iron bar is inserted for exerting pressure on the rope, as shown. Such an arrangement can also be used for uprooting small saplings.





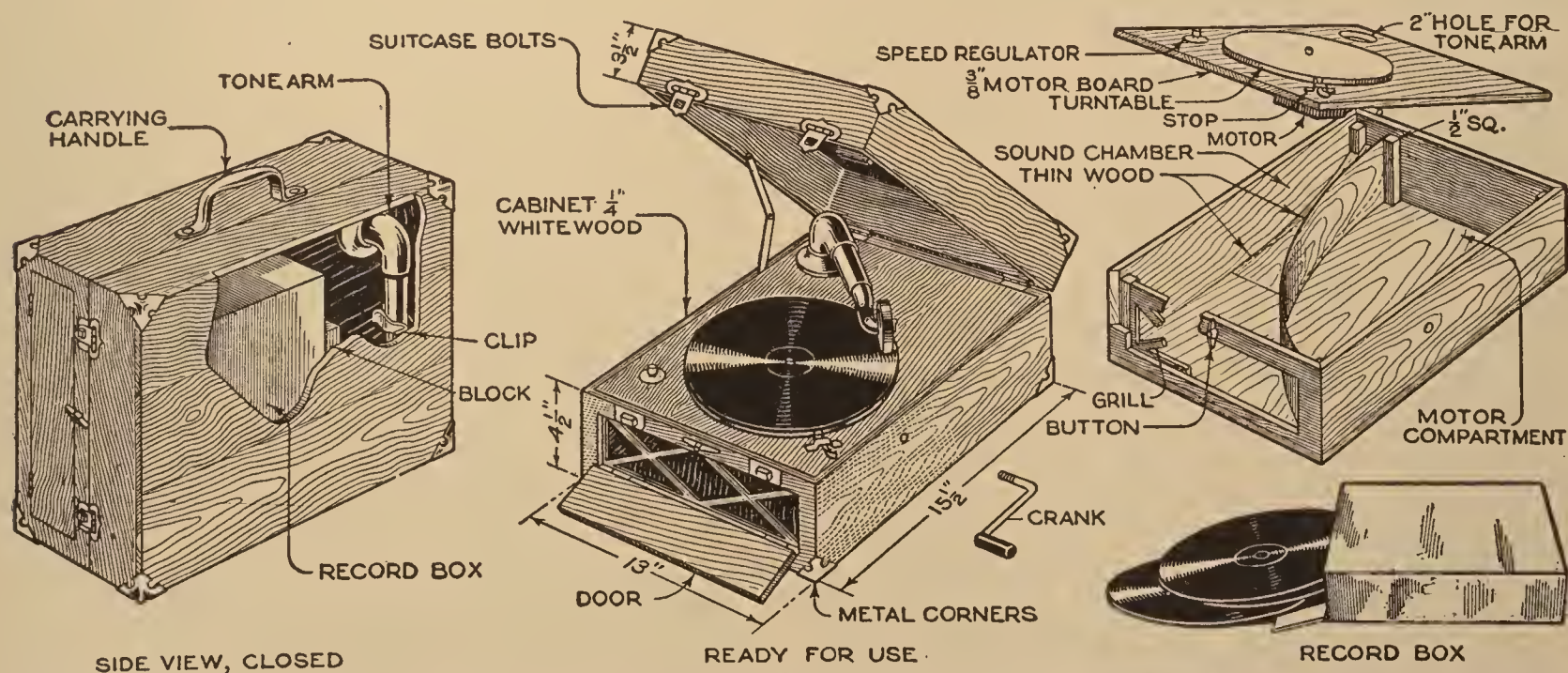
Cheap Portable Phonograph for the Camp

BY H. E. MENDE

AROUND the camp fire, or drifting down some moonlit stream in a canoe, the lover of outdoor life feels the need of music to complete the enjoyment of his outing; if he is not a player of some instrument, he must depend upon music of the "canned" variety, and it is the purpose of this article to describe the construction of a portable phonograph, small and light enough to be easily carried. Anyone who is at all handy with tools can build this machine, and while dimensions are given in the drawing, they are merely suggestive, as it is quite possible that some departure from them will be required, owing to the variation in size of the mechanical equipment.

The first consideration is the cabinet. This may be made of any kind of wood, although whitewood is suggested on account of its lightness. If lightness is a prime consideration, $\frac{1}{4}$ -in. material is advisable, but if lightness can be subordinated to strength, $\frac{3}{8}$ -in. material will, of course, be better. As shown in the drawing, the inside corners of the cabinet are reinforced by square posts, which also serve as supports for the motor board, which is attached with screws.

The necessary mechanical parts, such as a spring motor, turntable, reproducer, tone arm, crank, and other accessories, may be taken from an old machine or bought from a dealer in phonograph supplies. If this equipment is purchased, the cost will be somewhere around \$5. Make a 1-in. hole in the motor board for the turntable spindle, and place the spindle so that the crank side of the motor is at the right; then, with a pencil, mark the location of the motor bolt holes; after drilling these, bolt the motor in place, using one or more rubber washers on the bolts between the motor and the bottom of the board. The height of the upper edge of the turntable from the top of the motor board should be about $\frac{1}{2}$ in., washers being added or removed to obtain this height, which is just sufficient to allow proper clearance between the turntable and the motor board when the former is in place on the spindle. Cut a hole at the left rear corner for the tone arm; this hole should be so located that, when the tone arm is in place, the needle holder on the reproducer will be just about in line with the turntable spindle. The speed regulator and turntable stop are located



Many Times the Lover of Outdoor Life Feels the Need of Music to Complete His Enjoyment of Nature's Charms; If He Is Not a Player of Some Instrument He must Depend on "Canned" Music. This Phonograph Is Light Enough to Be Readily Portable and Strong Enough to Withstand Considerable Rough Usage

on the motor board with reference to the construction of the motor, although the location shown will be found to represent average practice. After a hole has been drilled through the right side of the cabinet for the winding crank, the motor board and its attached equipment is completed and ready for installation.

As shown in the drawing, the corner posts of the cabinet are short enough to permit the motor board to come flush with the top. The sound chamber, or "horn," is shaped according to the space occupied by the motor, and may be made from two strips of thin wood, heavy cardboard, or metal. The bottom strip curves upward from about the center of the box to the rear, the side strip being curved to clear the motor; these strips are attached with glue and small screws. A small door, as indicated in the drawing, is provided at the front of the cabinet, and since some backing is required for the door when closed, an ornamental grill serves the double purpose of adding to the appearance and preventing the door from being pushed in. A small metal button holds the door when closed.

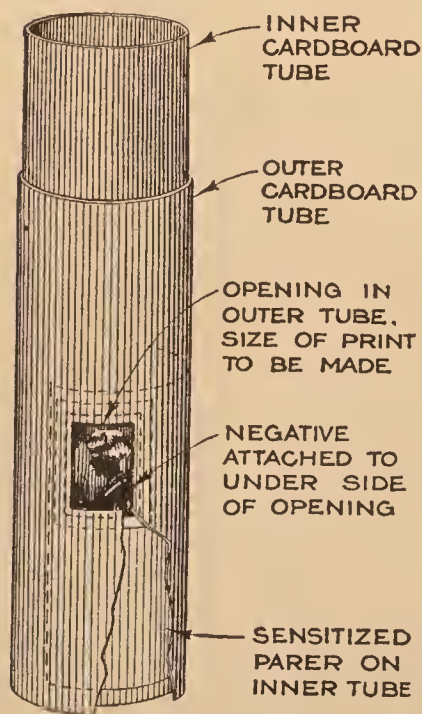
Owing to the variation in the height of various tone arms, it is quite likely that some deviation from the dimension given

for the height of the lid will be required, and it is therefore best to delay making the lid until the motor board has been installed, so that the exact amount of space can be determined and an additional $\frac{1}{8}$ or $\frac{1}{4}$ in. allowed for clearance. A metal clip, such as the one shown in the drawing, is attached inside the lid, for holding the tone arm when the lid is closed. As the machine without records would be useless, a record box, made from cardboard, thin wood, or metal, of sufficient depth to fill the space between the turntable and the lid and wide enough for a 10-in. record, should be made. A small block attached inside the lid, as shown, prevents the record box from shifting; such a box will hold a dozen or more records. The machine is completed by staining and varnishing as desired, or by covering with leatherette, and by the addition of a suitable carrying handle, suitcase bolts, metal corners, and such other fittings as the taste of the builder may suggest.

Such a machine, properly made, will weigh about 10 lb., will be strong enough to withstand considerable rough treatment, and will be found one of the most valuable and entertaining adjuncts to any outing party.

Making Gummed Stamp Photos

Gummed stamp photos that can be applied to stationery, business cards, etc., are easily printed from any small film negative and, as a dozen or so prints can be made on one 4 by 5-in. sheet of paper, the cost per print is slight. Two cardboard tubes will



be required, one of them being small enough to fit snugly inside the other. An opening, the size and shape of the prints to be made, is cut in the outer tube, to the underside of which the film is attached with strips of gummed paper. A sheet of single-weight, sensitized paper is attached by the corners to one end of the in-

ner tube, sensitized surface up.

To make the prints, the tube to which

the paper is attached is inserted into the tube containing the negative, so that the film will be over the upper left-hand corner of the paper. Expose in the usual manner, and then turn the inner tube to the left just enough to protect the exposure previously made; this operation is repeated until the opposite edge of the paper is reached, when the inner tube is drawn out and another row of exposures is made. When the prints have been developed and treated in the customary manner, they are allowed to dry thoroughly, in preparation for the gumming operation.

The gumming, or coating the backs of the prints with adhesive, requires a sheet of celluloid; this is thoroughly cleaned and the backs of the dry prints are given an even coating of thin mucilage. The gummed prints are placed against the celluloid, mucilage side down, and pressed into contact, but not enough to squeeze the mucilage out around the edges. Allow the mucilage to dry and strip the prints from the celluloid. The celluloid sheet should be larger than the paper and may be used repeatedly by cleaning with warm water, and drying, each time it is to be used. The completed prints are

separated with a pair of shears or on a trimming board.—Wm. Underwood, Tunnel Hill, Ill.

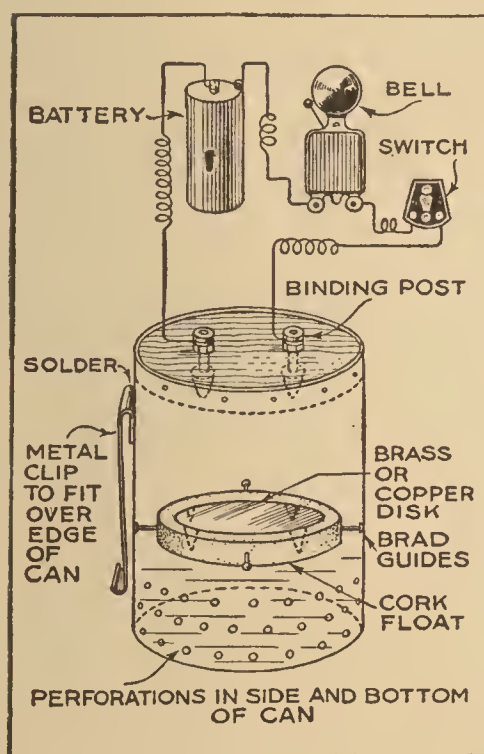
Making Lawn Mower Cut Easily

It often happens that a lawn mower, even when newly sharpened, chokes very easily and requires to be backed up and run forward again several times when cutting, especially in heavy grass.

This can be cured by taking a heavy triangular file, and deepening the grooves in the traction surface of the driving wheels, causing them to take a firmer grip, and forcing the barrel to revolve; this simple remedy will save much back-breaking work on the part of the operator.

Alarm Prevents Overflowing of Ice Box

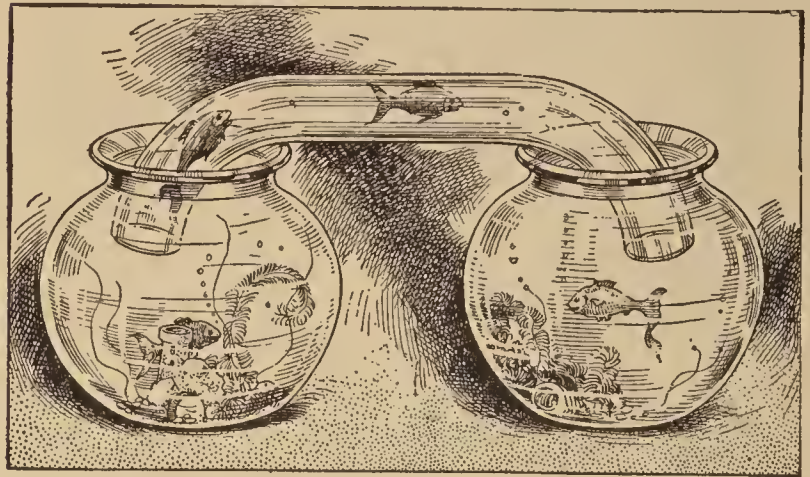
An effective alarm that can be attached to or detached from the drip pan of an ice box without danger of affecting its operation is made as shown in the drawing. An ordinary tin can is obtained and one end is cut away, close to the edge, and the bottom and lower part of the can are perforated to permit water to enter. A large, flat cork, of smaller diameter than the can, is obtained and given a coat



of shellac, or melted paraffin, and four wire brads are inserted at diametrically opposite points, as guides. A brass or copper disk is made as shown, with four or more points around the edge, which are driven into the cork. The top of the can is closed by a disk of wood that has been waterproofed by dipping in melted paraffin; this disk contains the binding posts, the lower ends of which establish a circuit, when the water level in the pan floats the metal-surfaced cork to the proper height. A metal clip, to hold the device to the side of the pan, may be soldered to the side, as indicated, or it may be merely set in the pan. This alarm is intended to be used in connection with the simple bell circuit shown.—Geo. E. Perkins, S. Bound Brook, N. J.

Goldfish Travel from Bowl to Bowl

An interesting and entertaining arrangement, that permits goldfish in one bowl



An Arrangement That Permits Goldfish in One Bowl to Swim to Another through a Glass Tube

to travel to another, is effected as shown in the drawing. An extra fish bowl is provided, and filled with water to the same height as the one containing the fish. Then a piece of glass tube, of large diameter, is made into an elongated "U," by heating where the bends are to be, and slowly bending. This U-shaped tube, after it has cooled, is filled with water and one end is placed in each bowl. The water will remain in the glass tube, even though above the level of the two bowls, so long as the water in both is kept above the ends of the tube.—H. M. Bixby, St. Louis, Mo.

Carrier for Heavy Barrels

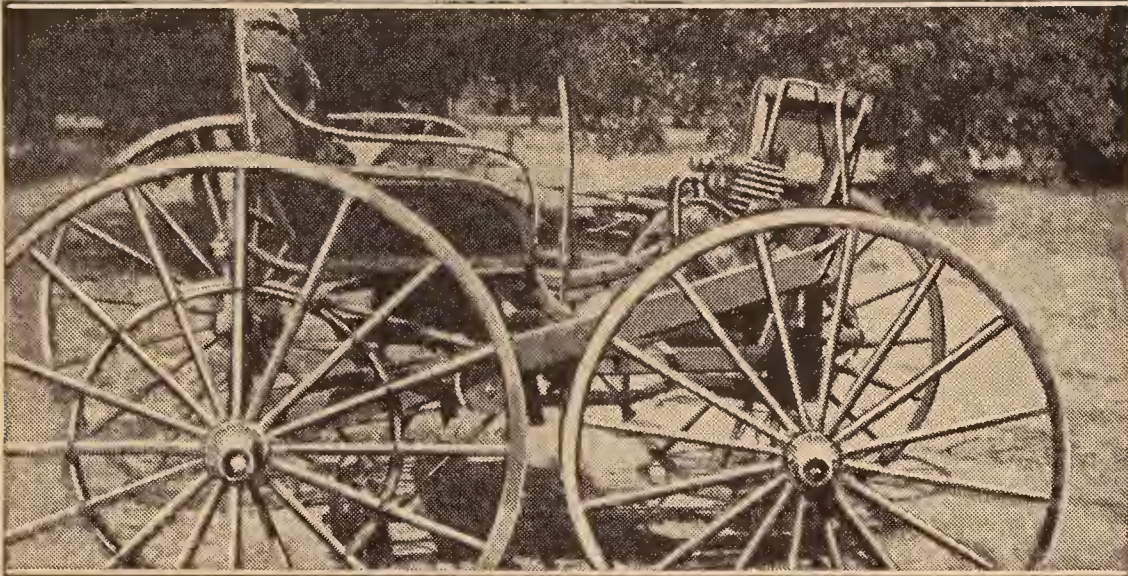
Barrels of fruit, or other commodities, that require careful handling by two men, being difficult to handle by gripping the chimes, the holder shown in the drawing provides a convenient means of moving such containers. The iron framework, as well as the handles, can be made by any blacksmith, from light stock. The handles



are attached to the frame with iron straps of convenient length, and adjustable straps are provided for holding the barrel in place when the carrier is in use, as indicated. If desired, the upper side of the horizontal part of the rods can be flattened to prevent slippage.

The Motorization of an Old Buggy

The illustration shows the "Gastropoda," as it has been termed by its builders. This novel vehicle, which appears to be, at first glance, a hybrid of the "one-hoss shay" and the early automobile, is



The "Gastropoda," Seemingly a Hybrid between the "One-Hoss Shay" and the Early Automobile Is Really Nothing but an Old Buggy Motorized

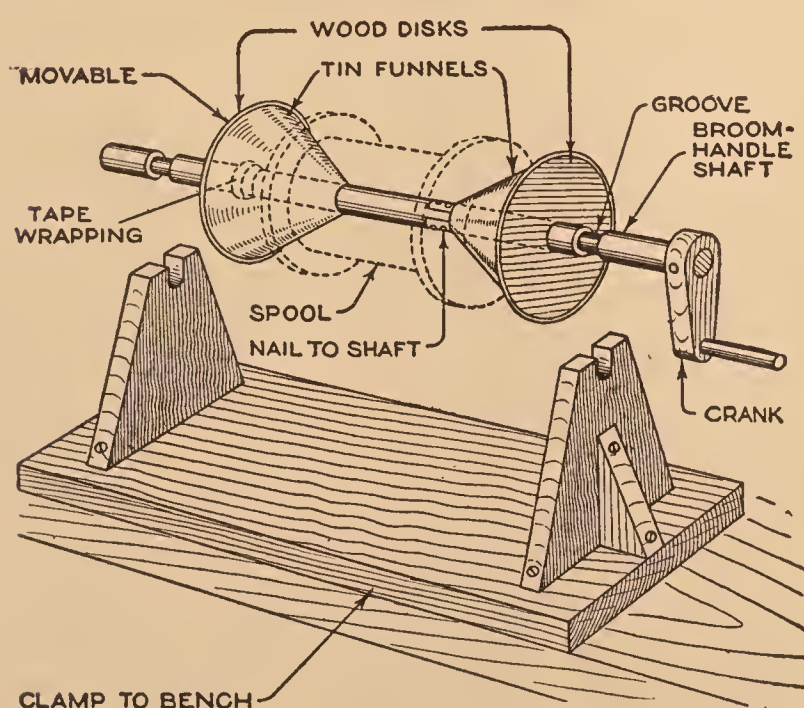
nothing more serious than an ancient buggy which has been motorized by the addition of a single-cylinder motorcycle engine. The strange-looking vehicle is driven by a belt from the jackshaft under the seat, power being transmitted to it from the engine by another belt. The

steering gear is the combined product of several junk piles and consists of some gas pipe, an old bicycle sprocket or two, and some chain—but it works. Fifteen miles an hour is claimed as the "Gastropoda's" speed record. The motorization of this relic of the pre-gasoline era was accomplished by the youthful designers at insignificant expense and without much alteration to the vehicle itself.

Winding Hollow Wireless Coils

The radio fan's enthusiasm for making his own apparatus does not begin to suffer until he starts winding coils on hollow cores. With the assistance of the winder shown in the drawing, coils of almost any length and diameter can be quickly and neatly wound.

A piece of old broom handle makes a suitable shaft, and grooves are cut about 3 in. from each end to fit into the endpieces of the support. Two tin funnels are obtained, and the tips are cut off so they will slide onto the shaft; one of these funnels is nailed in place on the end



A Coil-Winding Machine That Simplifies the Wireless Fan's Job of Winding Hollow Coils: The Apparatus Is Inexpensive and the Results Satisfying

where the crank, or pulley (if power is to be used), is to be attached. The other funnel moves freely on the shaft, and can be removed entirely. A wooden disk with holes at the center is attached inside the large end of each funnel, for rigidity. A simple support is made, such as the one shown in the drawing, with the endpieces a suitable distance apart. In use, the movable funnel is slipped off and the spool is put on; the funnel is then replaced, and pushed up until the spool is held firmly in place between the two funnels, as shown. The movable funnel is held in place by wedges, or by a wrapping of tape around the shaft, and the winding is proceeded with in the usual manner.—James B. Keller, Alexandria, La.

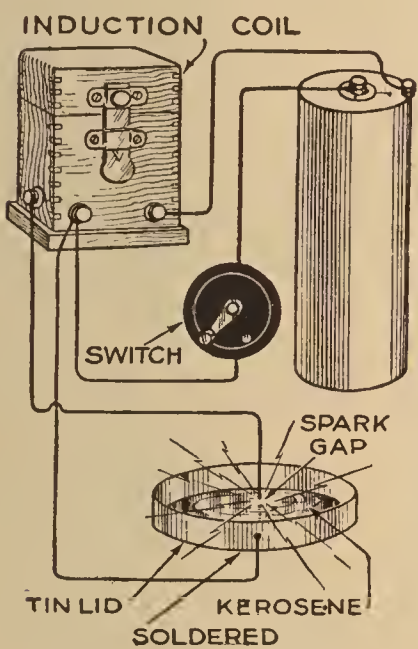
Tanning Rabbit Skins

Rabbit furs can be made up into garments or used for garment linings, as well as for the trimmings on muffs and other fur pieces. Most attempts at tanning these skins have not been very successful, but the following process has been found to give satisfactory results: First, the flesh side of the hide is gone over and all possible flesh is removed by scraping, great care being exercised against cutting through the skin. After scraping, rub in salt, roll up the pelts, and put them away for 24 hours. A solution of $\frac{1}{2}$ oz. of sulphuric acid, 2 lb. common table salt, 4 oz. powdered alum, and 5 gal. water is mixed in a large container.

After the ingredients have been thoroughly dissolved, the mixture is stirred and the hides placed in it. The container is covered and set away. The hides are allowed to remain in the solution for nine or ten days and should be stirred around two or three times a day during this period. When the hides are removed, they are washed with warm water and soap, this process being repeated two or three times. The hides are then tacked out and stretched, and the flesh side wiped dry with woolen cloths. When dry, the flesh side is gone over with fine sandpaper, using care against rubbing too deeply. This completes the process, and the hides are ready to be cut and worked as desired.—Robert Page Lincoln, Minneapolis, Minn.

Producing Intermittent Lightning

With the assistance of a small jump-spark, or induction coil, the effect of lightning flashes can be obtained in the following manner: A shallow tin lid,



containing about half a teaspoonful of kerosene, is connected to one wire from the coil, in the manner shown; the other wire from the coil is arranged over the oil, with a small gap for the spark to jump across to the oil. When the switch is closed, the spark passes between the oil

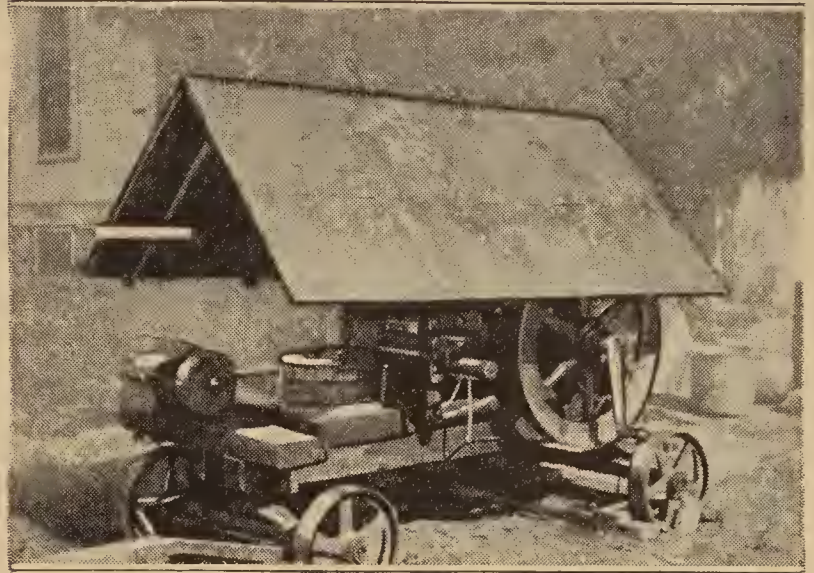
and the wire above it, volatilizing the oil which ignites with a flash, and as suddenly dies away; as long as the switch is closed this intermittent flashing continues. A good, hot spark is required, and the spark gap should be very short.—K. McLean, Caledon, S. Africa.

Cutting Large Saplings with Penknife

Saplings of considerable size can be cut with an ordinary penknife if they are bent over and cut where the bend is sharpest. Either the edge of the blade or the point can be used, the knife being worked back and forth like a saw in the former case, while in the latter the cuts should be made in the same direction. The wood will part in threads, leaving small splinters sticking from the cut ends.

A Light Roof for a Portable Engine

A removable roof, for protecting a portable engine from the weather when



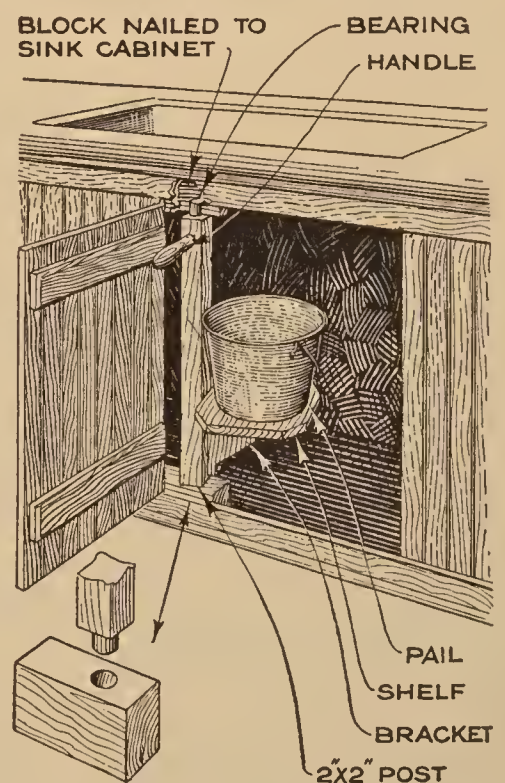
A Removable Roof for Protecting a Portable Gasoline Engine from the Ravages of the Elements When the Rig is Left Exposed on the Farm

left exposed, is used as in the engraving. This roof is made of tin, over a light, but strong wooden frame, which is designed to rest on top of the engine when in place. Such a covering provides shelter and protects the engine from the elements wherever it may be on the farm.—Mrs. Ruth Darling Shultis, Grand Junction, Colo.

Pail Concealed under Sink

In order that the garbage pail may be kept convenient, and at the same time out of sight and away from flies, the arrangement shown in the drawing was installed underneath the sink cabinet.

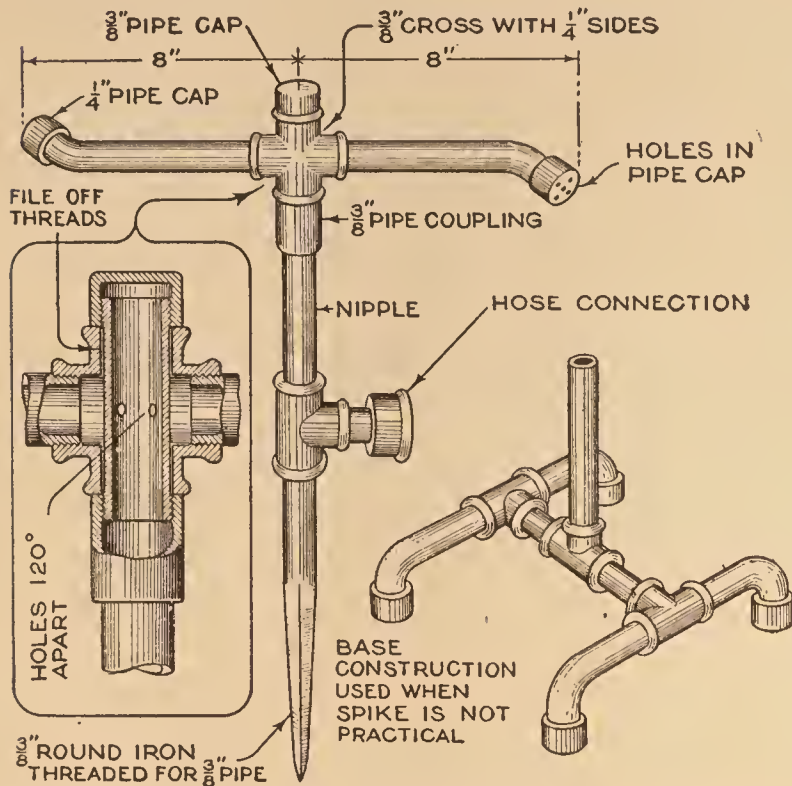
The revolving post is provided at each end with a bearing about 1 in. long and these fit into holes drilled in two blocks, which are nailed to the inside of the cabinet in the manner shown. A



bracket and shelf for holding the bucket are attached to the post with screws, and a handle is provided at a convenient point near the top, so that the device can be turned to bring the bucket from its place of concealment.

Making a Lawn Sprinkler

The owner of a well-kept lawn exhibits a pardonable pride in having it referred to as "the nicest lawn on the street," and he accomplishes this largely by keeping the grass well moistened during warm

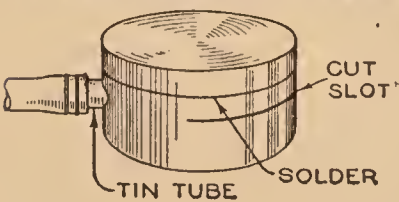
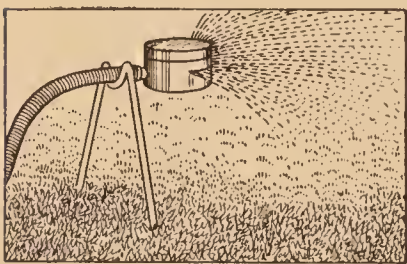


Whirling-Spray Lawn Sprinkler Made from Small Pipe and Fittings: No Machine Work of Any Kind is Required and All Parts are Easily Obtained

weather, otherwise it would dry up and assume a hopelessly "burnt" appearance.

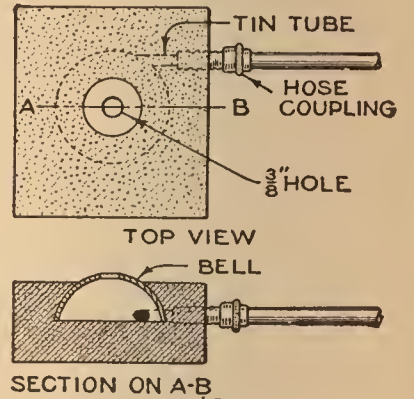
One of the simplest lawn sprinklers may be made from a shallow can provided with a thin slit in the side which extends about one-fourth of the circumference, as shown. On the opposite side of the can a hole is cut and a piece of tin tube, or pipe, is soldered to it for attaching the hose. Under ordinary pressure this spray will moisten an area of about 150 square feet.

Another simple sprinkler is made from the bell of an old alarm clock; some sand, cement, and a female hose coupling being also required. The hole in the bell is reamed out to about $\frac{3}{8}$ in. and a notch is cut in the edge to accommodate a piece of tin bent into a cylinder over a bolt. A small box form is partly filled with a half-and-half mixture of moistened cement and sand. The bell, nozzle, and hose connection are set in place, and the form is filled level with the cement mixture. A hole



will have to be cut in the side of the form to allow the hose coupling to project.

A more ambitious effort is the whirling sprinkler made of pipe and pipe fittings. No machine work is required and the parts are readily obtainable. The sprinkler head consists of a $\frac{3}{8}$ -in. cross, with $\frac{1}{4}$ -in. side outlets, having the threads filed out with a round file until the cross slips easily over a $\frac{3}{8}$ -in. nipple, which has also been filed until it is round and smooth. The nipple is of such a length that, when it has the cap screwed on and the other end is screwed into a sleeve, the cross will just fit between them. Three $\frac{1}{4}$ -in. holes are drilled in the



nipple, as nearly as possible 120° apart, on the center line of the side outlet pipes, so that one hole will always be open to each side of the cross. The holes in the outlet pipes and caps are drilled with a $\frac{1}{16}$ -in. drill. If possible, it is suggested that the holes be made with a smaller drill, but unless extraordinary care is exercised, or a sensitive drill press is available, the size mentioned is about the



smallest that can be used in a hand drill, and even then considerable care must be used to prevent drill breakage.

If a lathe is available the cross is held in the lathe chuck and bored to $\frac{21}{32}$ in. and its ends turned true. A piece of $\frac{7}{8}$ -in. cold-rolled round steel is then turned to fit the cross, being turned down far enough to project through the cross and leave room for a collar; a $\frac{3}{8}$ -in. hole is then drilled in the other end to intersect the three $\frac{1}{4}$ -in. holes that are drilled in line with the horizontal openings of the cross and 120° apart, as described. This end is then turned to $\frac{1}{2}$ -in. pipe size and threaded with $\frac{1}{2}$ -in. standard pipe thread. A collar is then made to fit on the end of the rod projecting through the top of the cross; this collar holds the sprinkler together.

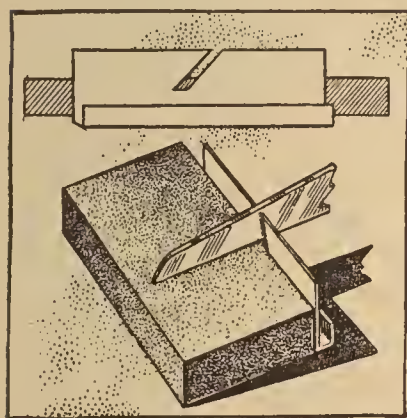
☐ Clear glass (or celluloid) on a photographic negative indicates underexposure.

Making Polishing Wheels

Wheels for polishing metal parts are easily made by using a leather-faced wooden disk covered with abrasive of the desired grain. A hardwood disk of suitable thickness and diameter is provided, and a central hole is drilled through it to fit on the shaft on which it is to be used. A piece of leather belting is soaked in water until soft, and after it has been stretched until some of the water has been removed, it is glued to the face of the wheel. The leather is made a trifle longer than the circumference of the wheel, and the ends are tapered, or scarfed, so that when they are made to overlap, a smooth joint will be obtained. The polishing wheel is completed by giving the leather surface a thin coat of warm glue and covering it evenly with the abrasive powder while the glue is still wet. The wheel is then hung up and allowed to remain until the glue has dried.—R. C. Liebe, Goldsboro, N. C.

Device for Sharpening Scissors Assures Correct Bevel

When sharpening scissors, the amateur often has difficulty in discovering the correct angle at which the blade should be

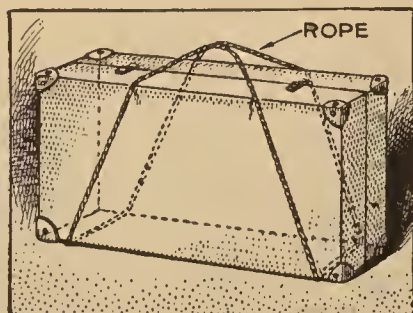


held on the stone, and in keeping the blade in this position during the whole time of sharpening. A piece of sheet iron, bent as shown, and having a slot cut at the proper angle, will be of great assistance in getting

a proper edge on the shears or scissors. If other bevels are to be used, other slots can be cut in the same gauge.

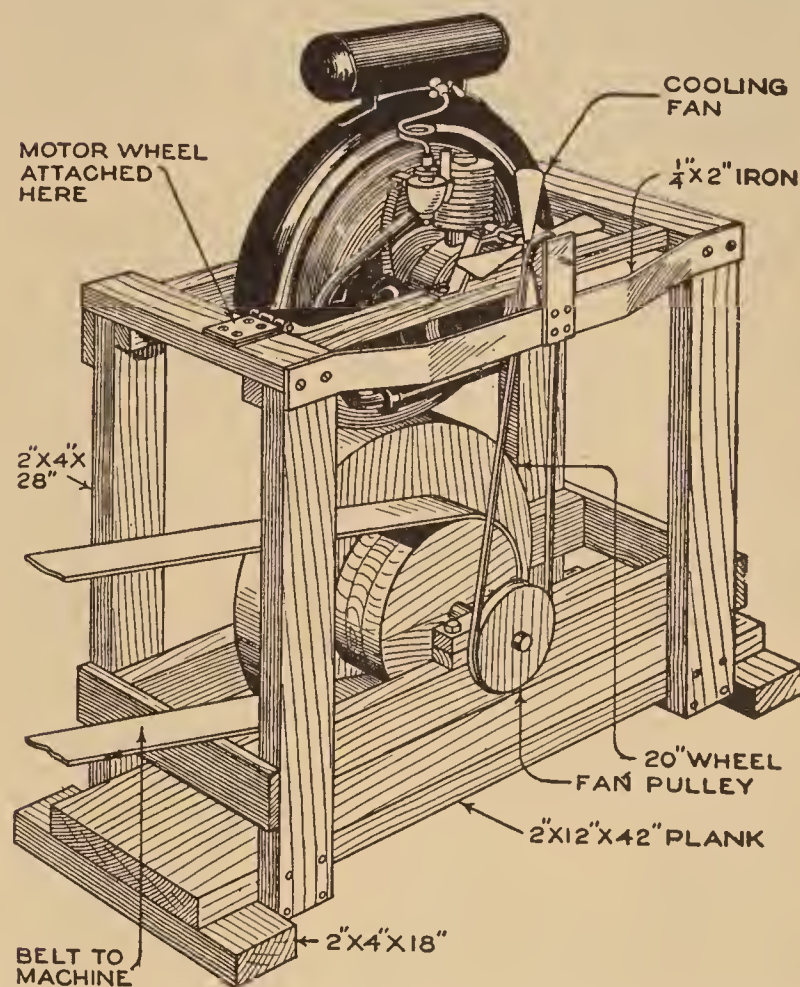
Rope Handle for Suitcase

An emergency handle for a suitcase or handbag is easily made from a short piece of rope. The ends of the rope are tied together, to form a circle. Catch up the rope on opposite sides, leaving the ends to form loops, which are slipped over the ends of the suitcase in the manner shown in the drawing.



A Motor Wheel as a Power Plant

Only a few minutes are required to remove a motor wheel from the bicycle on



A Bicycle Motor Wheel Provides Power for the Operation of Various Light Machines, Such as a Feed Cutter or Washing Machine

which it is used, and set it up to furnish power for operating a washing machine, feed cutter, or other light machine.

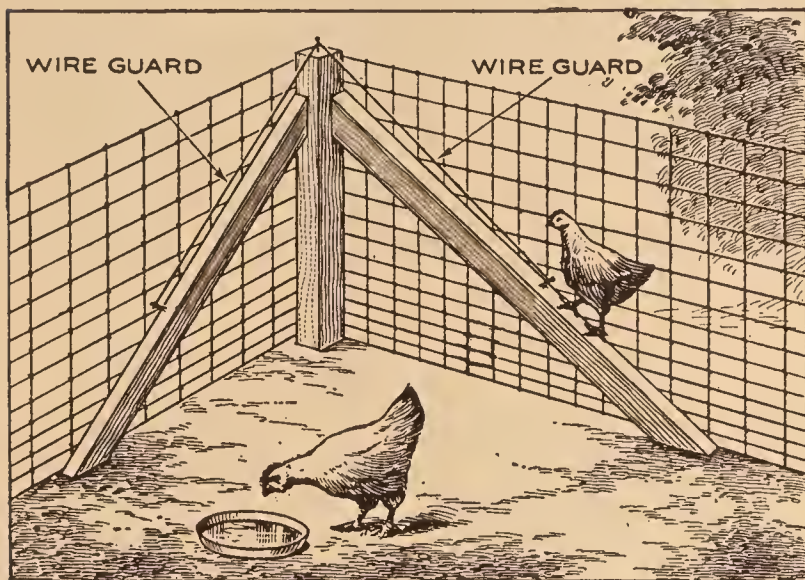
A substantial wooden frame is built, and securely assembled with nails or bolts. Two pieces of strap iron are bent to form brackets and bearings for the cooling fan. The cooling fan consists of the rear hub of an old bicycle, to the sprocket of which the sheet-metal fan blades are attached. The bracket, for attaching the motor to the frame, is made by fitting a piece of sheet iron to a hinge, and slipping the other end of it over the attaching bolt on the motor. The pulleys are made by cutting a number of disks from a 1-in. board, and nailing them together, so the grain will be at right angles. These pulleys should be faced with several layers of canvas, tacked and glued in place. A piece of $\frac{3}{4}$ -in. pipe forms the shaft, and should be supported on metal or hardwood bearings, as shown. The pulleys are attached to turn with the shaft. An easy way of doing this is to cut a mortise on each side of the pulley, to fit a large-size nut, which slips over the shaft and is held in place with a setscrew through one of its sides.

When ready for use, the bracket is slipped over the attaching bolt of the motor, which is lifted to its place in the

frame. The bracket is bolted to the frame. The tire of the motor wheel should be in the center of the wheel, and exactly in line with it. The motor is lifted at the rear, and started by hand. If not allowed to overheat, using the motor for power purposes should not injure it more than normal usage on the road.

Wire Guard Prevents Poultry from Escaping

Poultry kept in an inclosure sometimes form the habit of walking up the braces

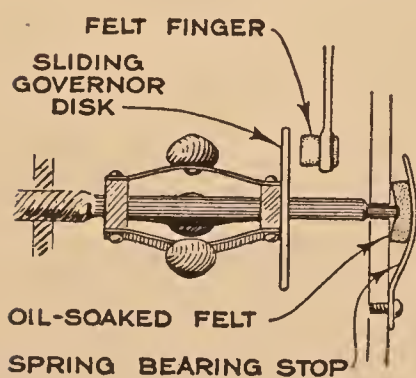


A Piece of Wire Fastened to the Braces of Corner Posts in the Poultry Yard Makes It Impossible for Fowls, That have Formed the Habit of Walking up the Braces, to Escape

at the corner posts, and flying out. A simple means of preventing this is shown in the drawing. A piece of scrap wire is fastened to each brace and to the top of the post, so that the chickens are thrown off when they attempt to climb up the brace.

Quieting a Phonograph Motor

Many phonograph motors, after being in use for some time, develop strange noises which can often be heard above the selection being played. Aside from



improper oiling, one of the main causes of these noises is wear at one end of the governor shaft; this wear permits so much end movement that the slack in the worm gear produces an annoying clatter, or hum. A factory "dodge," to eliminate this backlash, is to insert a piece of oil-soaked felt between the bearing stop and the end of the governor shaft. The bearing

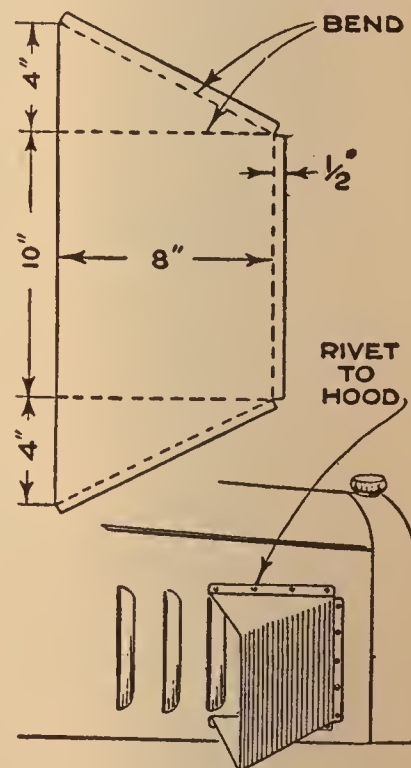
stop is loosened and pushed to one side, and a piece of oil-soaked felt, about $\frac{1}{4}$ in. square, is set against the end of the shaft; the bearing stop is pushed back to its original position, to hold the felt in place, and tightened up. The pressure of the springy felt against the end of the shaft takes up the backlash in the shaft, and causes the motor to operate quietly.—L. B. Robbins, Harwich, Mass.

A Cheap Radiator Cement

While the application of radiator cements which are mixed with the cooling water is generally frowned upon, there are times when such a cement can be used without injury, for stopping very small leaks. A cheap and effective radiator cement of this character can be obtained from almost any druggist in the form of water glass, or sodium silicate. A pint of the water glass is poured into the radiator, which should be filled with water; then start the engine and let it run for a few minutes until the cement circulates to all parts of the cooling system. Allow the water to remain in the radiator overnight, drain off and refill with clean water in the morning.

Deflector Improves Cooling System of Automobiles

Automobiles equipped with thermosiphon cooling systems overheat rapidly, when traveling through mud or sand in "low," and in hot weather. This overheating can be largely reduced by increasing the circulation of air through the radiator and around the engine, and the simplest way of doing this, short of removing the hood, is to cut an opening in the latter and attach a deflector over it, as indicated in the drawing.



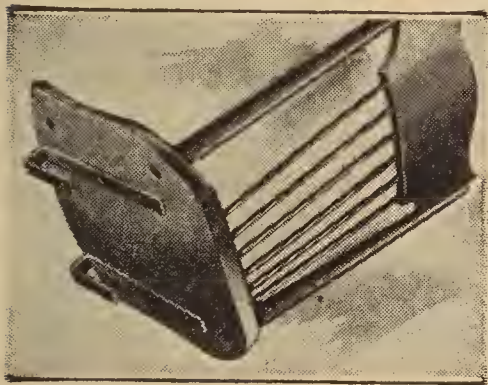
With such a deflector mounted on each side of the hood, the draft caused by the movement of the car insures good cooling. The deflectors are partly concealed by the mudguards and are not unsightly.—Thos. W. Benson, Philadelphia, Pa.

Tobacco Humidors Make Cookie Jars

The glass jars in which several popular brands of smoking tobacco are packed, make fine containers for candies and cookies, but without the clamp and rubber gasket with which the jars are usually fitted, they are not air-tight. By using a medium grade of valve-grinding compound the covers can be made air-tight with little trouble. Proceed as when grinding a valve; spread the compound thinly on the top lip of the jar and rotate the cover, applying light pressure, lifting it occasionally and giving it a quarter turn. After grinding a few minutes, wipe off and examine the grinding marks. When they make a continuous trace around both the top of the jar and the cover, finish with fine grinding compound.—C. S. Bartless, Corinth, Miss.

Boat Seat Made from Chair

A comfortable seat for the boat, which is readily attached to or detached from the regular thwart,

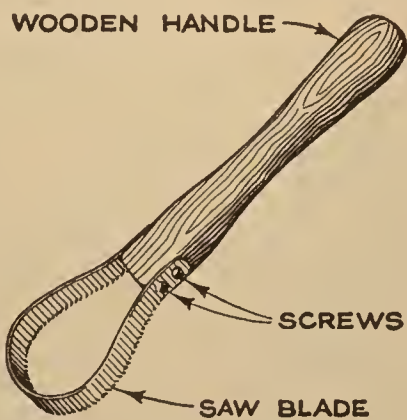


is made as shown in the photograph, from an old chair. Iron clips are made and securely attached to the bottom of the chair seat with

screws or, better still, with round-headed bolts. A seat of this description is particularly convenient when fishing or hunting. The same kind of seat can be slipped onto the ordinary board seat of a farm wagon.

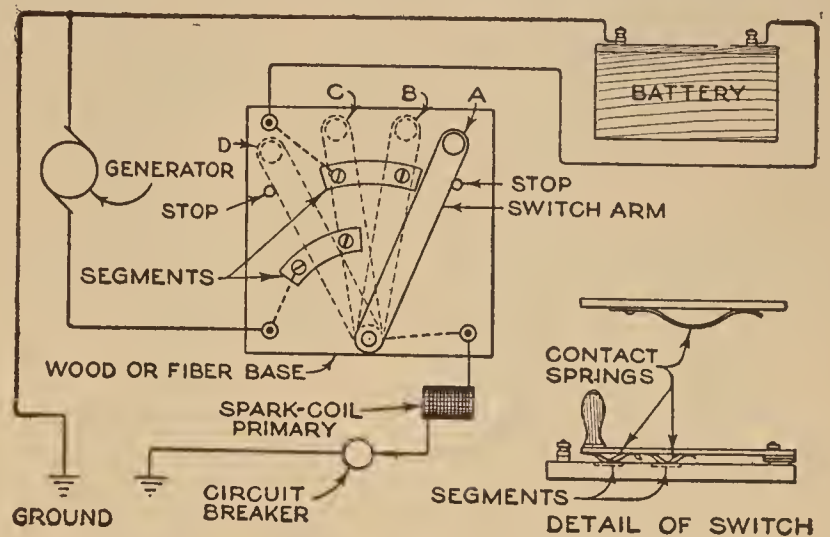
Pot Scraper Made from Saw Blade

A scraper for cleaning kitchen utensils, such as pots, kettles, pans, and the like, may be made from a piece of broken buck-saw blade attached to a short wooden handle, as shown in the drawing. The steel being thin and flexible, it is easily made to conform to the curved sides of a vessel and reach every part except sharp angles. The saw teeth may be filed off or left on as desired. However, both edges can be used.



Switch for Battery Charging on Motorboat

To prevent the storage battery from exhausting itself through the generator



Simple Switch to Prevent the Storage Battery from Exhausting Itself, for Motorboat Circuits Where Both Generator and Storage Battery are Used

windings when the engine is stopped, the simple switch shown in the drawing will be found to work successfully on motorboat circuits where the combination of generator and storage battery is used.

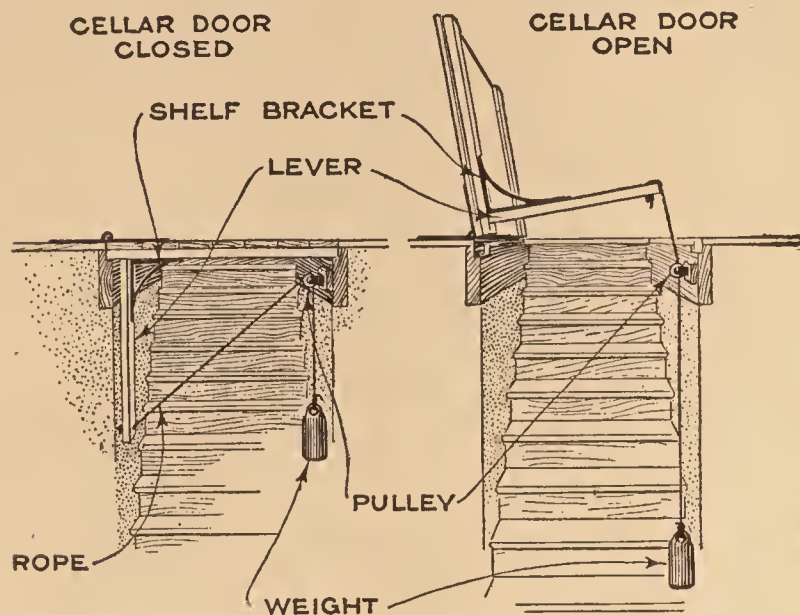
The switch base is made of wood, fiber, or other nonconducting material. A switch lever is pivoted to the bottom with a small bolt, and wired to a binding post at some convenient point. Two segments of copper, or brass, shaped to follow the sweep of the lever, are fastened to the base with countersunk screws. Each segment is connected to a binding post. The storage battery is connected to the upper segment; the generator, or dynamo, to the lower one, and the switch lever to one side of the ignition circuit. The wiring is completed as shown. Light spring-brass fingers are riveted to the underside of the switch lever, to bear against the segments and insure good contact.

When the switch is placed at A, all circuits are open. At B, the battery is thrown into the ignition circuit so the engine may be started; at C, after the engine is running, both battery and generator are in the circuit, and the generator will charge the battery. When the battery is sufficiently charged, place the lever at D, which cuts out the battery and runs the engine from the generator alone. To stop the engine, push the lever back to A; this not only cuts out the ignition circuit but disconnects the generator from the battery as well, and prevents the passage of current.

A pin stop at each side of the switch base prevents the lever from dropping over too far.

Concealed Cellar-Door Lift

The usual unsightly, exposed counterweight for relieving some of the effort necessary to raise a heavy cellar door



The Usual Exposed Counterweight, for Relieving Some of the Effort in Lifting a Cellar Door, can be Easily Hidden from View

can be easily hidden from view, without diminishing its effectiveness. As shown in the drawing, a wooden arm the width of the cellar opening, is placed at right angles to the underside of the door, near the edge next the hinges, a shelf bracket being used in the angle, as a brace; on the wall directly opposite, and just beneath the door, a pulley is located. The rope is attached to the outer end of the arm and is passed over the pulley, the other end of the rope having the counterweight attached to it.—D. G. Barnett, Mt. Summit, Ind.

Reducing Culls in Apple Orchards

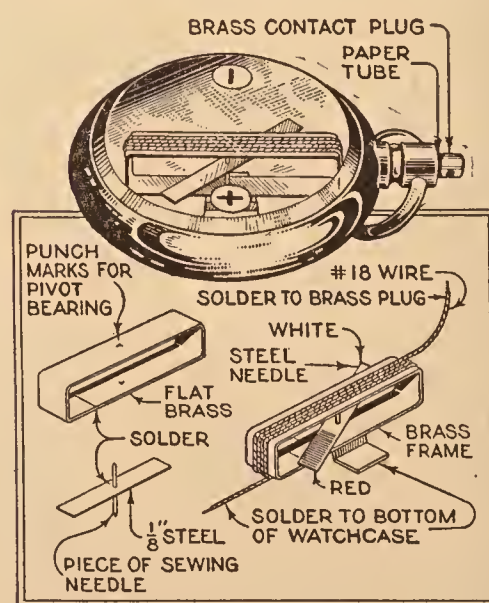
The owner of a large number of apple trees is forced by business reasons to acquire a thorough knowledge of the orchardist's lore; he becomes a professional. The owner of a few trees usually remains an amateur and knows few, if any, of the kinks of apple culture that are commonplace to the experienced grower, but these little kinks count even when only a few trees are owned. It was so with the man who had two big, thrifty apple trees in his backyard. These trees always set fruit well, but summer hopes always gave way to harvest disappointment; the apples never colored well, and a large portion of them dropped off before the time for picking. Instead of taking these deficiencies as a matter of course, the "backyardist" consulted a professional fruit-grower, a man who had several thousand trees and had grown old in the business. He received suggestions which, taken to-

gether, solved the problem for him. Thinning was one of these; the idea of picking green apples in summer and throwing them away, is hard for many orchardists to reconcile themselves to, but veteran growers declare there is hardly any orchard operation that pays so well. Picking the "runts" and culls by hand in summer, cuts down the percentage of culls in fall, and vastly increases the size and quality of the remaining fruit. The professional grower suggested at least two pickings, better still, three; this would check the dropping. The apples picked the first time would be the ripest and best colored; leaving them in small piles on the ground, in the sunshine, would help them to color more. Still another suggestion was pruning; "let more sun into the tree," he advised, "open up the top. Before ripening time, prune out some of the small, leafy branches." The windfall problem is always accentuated by tall limbs which whip. Cutting these back tends to reduce the number of windfalls.

Following these suggestions, the home orchardist converted trees which had been principally an aggravation into trees which gave real satisfaction.—John T. Bartlett, Boulder, Colo.

To Make a Watchcase Galvanometer

A convenient galvanometer and pole tester may be made from an old watchcase. A strip of brass, about $\frac{1}{4}$ in. wide, is bent to form a narrow rectangular frame, the ends of which are soldered



after two punch marks have been made as bearings for the needle. A short crosspiece is soldered across the bottom, as shown, for soldering to the watchcase. Wind the frame with from four to eight turns of No. 18 gauge bell wire. The needle is made from a strip of $\frac{1}{8}$ -in. steel, which is drilled at the center and soldered to a short piece of an ordinary sewing needle for a pivot. When finished, the needle is sprung into place with the ends of the pivot resting in the bearings made by the punch marks. One end of the needle is painted red and the other

white. The winding stem is removed from the watch, and its place is taken by a tight-fitting brass plug, insulated from the watchcase by a paper tube. The brass frame and one terminal of the coil are soldered to the bottom of the watchcase, the other terminal to the brass plug. Test the instrument with a dry cell and, underneath the glass, paste, at diametrically opposite points, two small pieces of paper marked with the conventional positive and negative signs, as indicated by the side to which the red half of the needle turns.

The first passage of current through the coil will magnetize the needle. Sudden application of current, or heavy currents, without suitable resistance between the source and the instrument, are likely to reverse the polarity of the needle and make readjustment necessary.

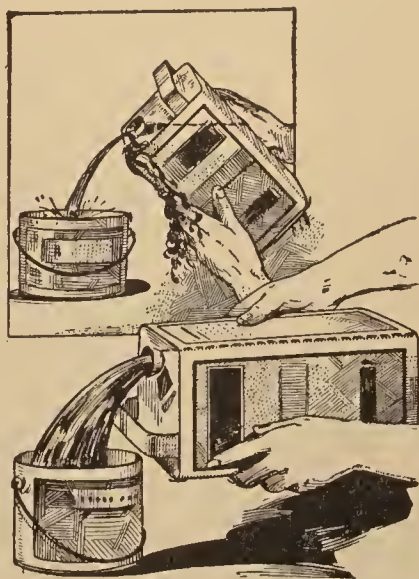
Top Spins by Whipping

A top that will keep spinning as long as it is "whipped" is easily made from a piece of hard wood by following the dimensions shown in the drawing. For a whip, use any piece of soft cord about 2 ft. long, tying one end of it to a stick of about the same length. Wrap the cord around the top and carelessly toss it out, to make it spin.

When it has almost stopped, "whip" it gently; the cord will wrap itself around the top, and drawing the whip away gives the top a new start.

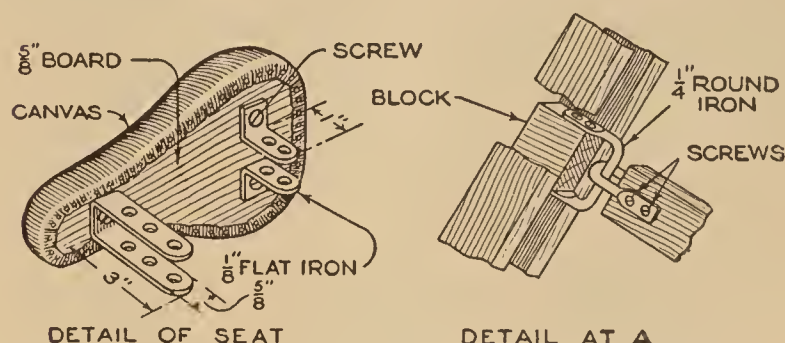
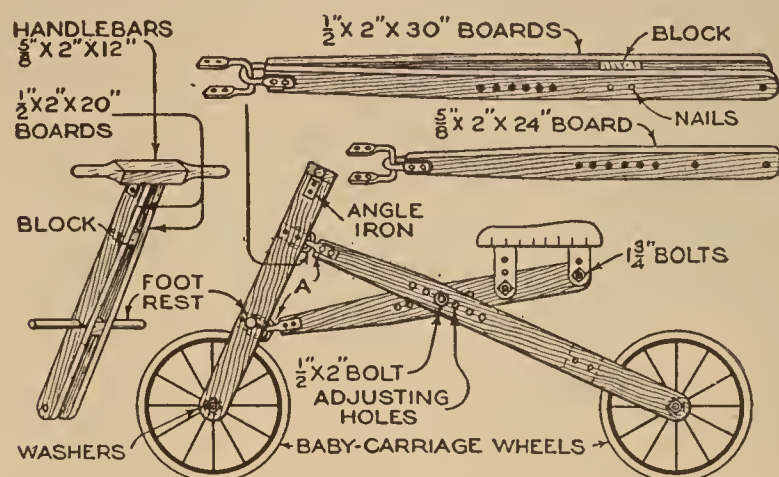
Pouring Liquids from Cans

In pouring varnish and other liquids from cans of the type shown in the drawing, many people waste a large part of the contents or at least spill it over their hands. By turning the can so the outlet is at the top of the can and then tilting it, all spilling and mess can be avoided.—Howard D. Wildman, Schenectady, N. Y.



Children's Adjustable Pushcycle

Boys between the ages of five and ten years hate to do "girlish" things, such as



A Pushcycle will Furnish Sport for the Small Boy and Teach Him to Balance, in Anticipation of the Day When He will Own a Real Bicycle

riding three-wheeled velocipedes, and their chief ambition is to own a bicycle, which few boys are allowed to do, owing to the dangers of the streets, and to the fact that they soon outgrow a bicycle suitable to their age. The pushcycle shown in the drawing will fill the gap, and can be readily made from a pair of wheels from an old baby carriage and strips of wood. As shown in the drawing, this cycle has all the features of the regular article with the exception of pedals, chain, and sprockets, the device being pushed along by the feet of the rider. As the owner grows older, and larger, the height of the seat is readjusted by removing the bolt at the center and putting it in another hole; for smaller children, the seat is brought nearer the ground in the same manner.

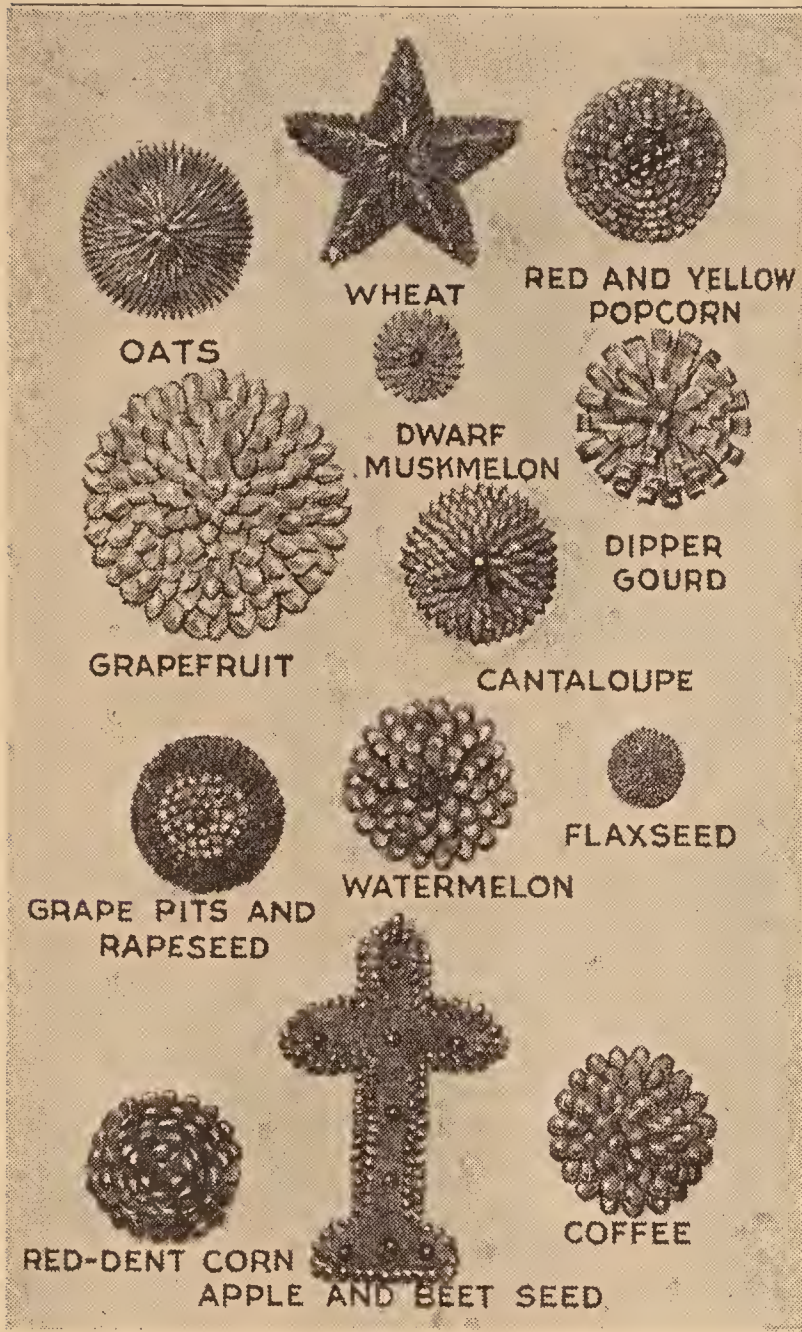
Acetylene as Camp-Fire Fuel

An enthusiastic automobile tourist carries with him on his trips into the virgin timber a tank of acetylene gas, a 10-ft. length of rubber hose, and a burner from a gas range, with a hose nipple attached.

When meal time arrives, the outfit is placed on the ground, and if rocks are handy, the burner is elevated 2 or 3 in. and other stones are piled around the burner to support the cooking utensils. The valve of the tank is turned on, the gas lighted at the burner, and the meal prepared.

Attractive Designs Made of Seeds

The remarkably "real"-looking flowers shown in the photograph were all made



A Collection of Flowers and Ornamental Designs Made by Gluing Various Seeds and Grains to Cardboard

from various seeds and grains. The star is made from grains of wheat and was especially difficult to make because many of the grains on the points of each layer and the top were mitered. The cross is made from apple pits and beet seeds, the soft brown tones being peculiarly pleasing.

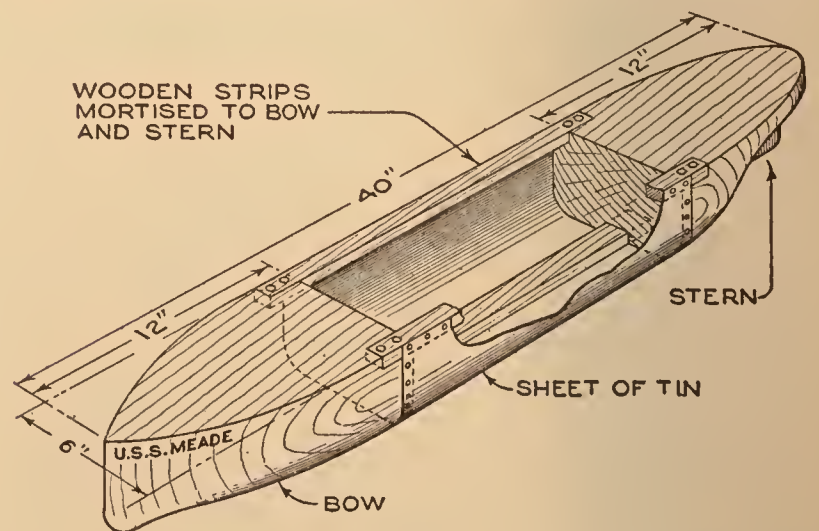
In making the flowers, a disk is first cut from cardboard and the seeds are applied around the edge with glue. The center is then built up with one or more layers of cardboard and the layers of seeds are applied until the design is finished. Beautiful effects are obtained by combining seeds of varying colors in the same design, and as shown in the photograph, quite faithful reproductions of such flowers as zinnias, dahlias, asters, and others are possible. Wire stems may be fastened to the back of the disks to form bouquets. — Clark Cooper, Cañon City, Colo.

Growing Colored Wood

Some interesting experiments have recently been conducted to show the possibility of coloring wood, so to speak, "on the hoof," the wood being colored through the absorption of aniline dyes before the tree is cut down. A slanting hole is drilled completely through the tree with an auger, and the lower end is closed with a plug. A very strong solution of aniline dye and water is poured into the hole and, as the mixture is absorbed by the tree, it is replenished from time to time. The amount of dye solution depends entirely upon the kind of tree; in some cases about a gallon a week is taken up and in others almost as much in a single day. The outer layers of the trunk are soon tinted, but a few weeks must elapse before the wood is colored to the heart. When the tree is cut down, it is found that the wood has been permanently and evenly dyed in the shade that has been employed, and is ready for use. Inasmuch as the dye has worked into the cellular tissue of the growing wood there is no possibility of cuts and scratches showing. This experiment is best conducted in the spring, when the sap is rising in the tree.—S. Leonard Bastin, Bournemouth, Eng.

Building Model Boat Hulls

The amateur naval constructor speedily learns that a boat hull is no simple thing to make, easy though it may look. However, by carving the bow and stern from blocks of wood and using tin, or other sheet metal, for extending the hull, a very satisfactory piece of work is obtained. After the bow and stern have been com-



An Easy Method of Building Model Boat Hulls will Find Considerable Favor among Amateurs

pleted, they are joined together at the desired distance apart with wooden strips; one at the bottom and one at each side,

as shown in the drawing. These strips fit flush into mortises that have been cut in the blocks to receive them. The open space between the stem and stern is closed by tacking a sheet of tin to the strips and wooden ends, with strips of rubber between to make water-tight joints. A wooden deck may be provided, and, if desired, masts, funnels, gun turrets, and other gear, may be added, depending on whether one is building a battleship or a merchantman.

Weatherproof Plant Record

To keep the name, purchase record, etc., of perennial plants, trees, and shrubs connected with the right plant is a difficult matter, and the record is generally more or less illegible. However, by making the record on strong paper with India ink and slipping it, right side out, into a small glass vial which is corked and attached to the plant or shrub, the gardener knows that the name and record of his plant can always be found.

Walking up a Rope

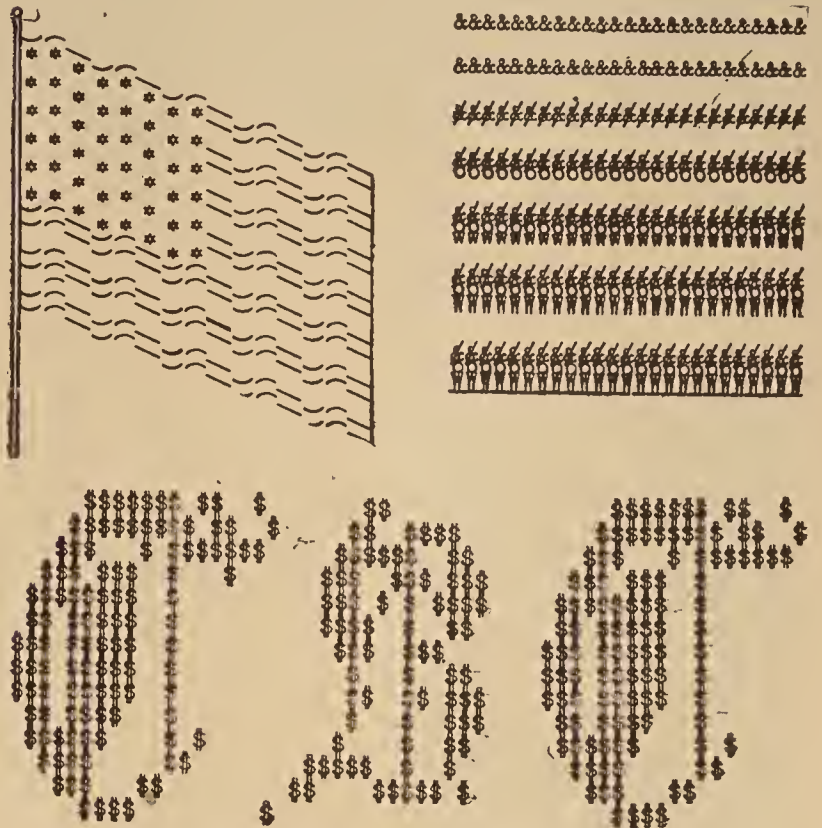
Attempting to salvage a cover that had blown over the edge of a bridge, a truck



driver fastened a rope to the bridge rail and descended, so rapidly that his hands were badly burned, and he could not climb back. The driver's helper, on the bridge, was unable to pull him up, but in the face of the situation, the helper took the rope, which was of ample length, and made loops in each end; both ends were lowered to the man below. The middle of the rope was wound once around the bridge rail, and held by the helper. The driver placed his feet in the loops, and raised one foot at a time, as though walking. As each leg was raised and the weight taken from that end of the rope, the man on the bridge pulled it enough to take up the slack. This operation was repeated until the driver reached the bridge.—F. McKissick, Tehama, Calif.

Tricks with the Typewriter

A common typewriter, besides its usefulness as a writing machine, can be made



Among the Designs Which can be Made on an Ordinary Typewriter Are the American Flag, Lines of Soldiers, and Various Kinds of Fancy Lettering

to produce various artistic and comical designs. A few of these are shown in the illustration, which was photographed directly from typewriting, no other means being employed for drawing any part of it.

The characters "X" and "\$" are the most useful for designing fancy letters, samples of which are shown in the illustration. These are made with the dollar sign only, and regular single-line spacing is used to give the vertical distance between the characters. The representation of a flag is also produced almost entirely by characters with regular spacing. This will be apparent if the picture is turned on its side. It will then be seen that each character is directly under another, as necessarily produced on a typewriter. For the straight lines, and the small "o" which forms a knob at the top of the flagstaff, the machine must be set so that the carriage turns free, and lines are then drawn with the underlining key. The stars are made by the asterisk of the typewriter; machines which are not provided with this character are therefore not as well adapted for flag drawing, though the small "x" may be used for the purpose.

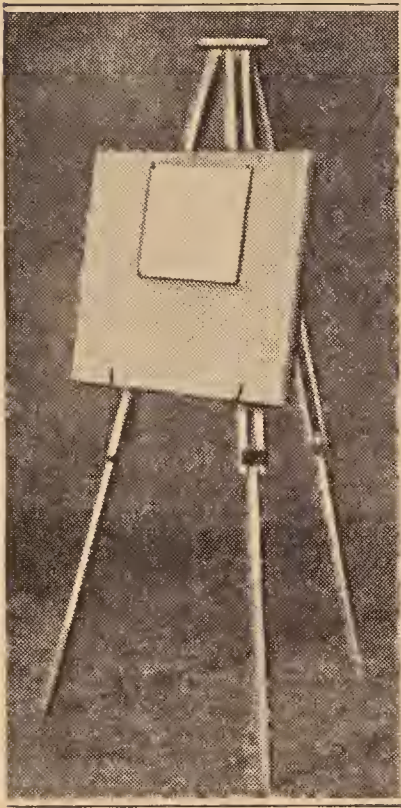
To the right of the flag are illustrated the successive steps by which a row of soldiers carrying guns is represented. For this, the carriage must turn free, and a little practice will be necessary in order to set the carriage so that the various characters will fit together properly.

Those used are, in their order, the "&," the diagonal line, the small "o," the small "w," the quotation mark, and the underlining key.

Various other combinations will occur to the typewriter artist, and by sufficient practice pictures of almost any object can be drawn in this manner.

Camera Tripod Makes Artist's Easel

A drawing or sketching easel is readily made from an ordinary photographer's camera tripod, or stand, and two

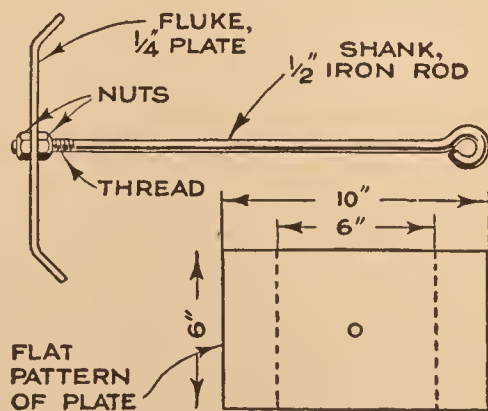


pieces of fairly heavy wire, each about 1 ft. long. Each of the wires is bent to form an S-shaped hook, one end of each being inserted in the opening in which the extension legs of the tripod slides. The bottom of the sketch board is held by the hooks, and the top is supported against the tripod legs. The board may be tilted at any angle by adjusting the third

leg of the tripod, while the height is regulated by lengthening or shortening the extension legs, as when used with a camera.—Rev. A. Schaal, Red Cloud, Neb.

Strong, Light Anchor for Rowboats

The majority of anchors used for small boats are of the rock variety—a heavy stone tied to the end of a rope; this form of anchor is anything but satisfactory, as after it has been used a few times the rope stretches, and the rock drops out. To eliminate this annoyance, the anchor shown in the drawing was designed. One end of the shank is threaded, and the other is bent to form an eye. After the iron-plate flukes have been formed, a hole is drilled at the center to accommodate the shank. To assemble the anchor, a nut



is screwed onto the threaded end of the shank as far as it will go, the fluke piece is placed in position, and another nut is turned up tight against the bottom; the end of the shank is upset to prevent the nut from backing off. Such an anchor, although small and light, will take a firm grip on the bottom, and will be found much more satisfactory than the rock type.—Frank W. Harth, New York, N. Y.

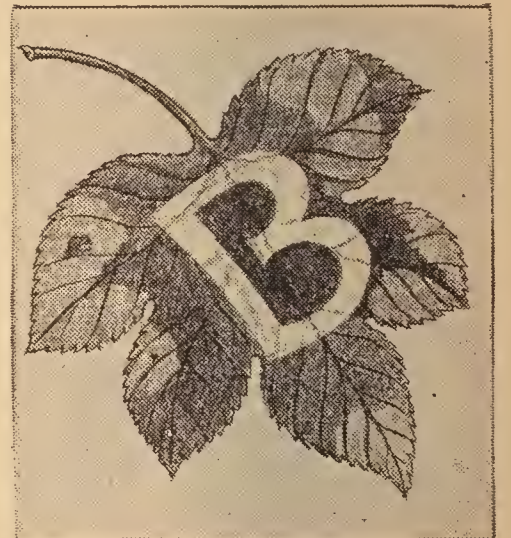
Removing Molded Letters from Bottles

It is sometimes desirable to erase molded letters from commercial bottles, and an easy method of doing this is simply to lay a sheet of rather coarse emery cloth on a flat surface and to rub the letters over it.

A few minutes suffices to remove the letters, and in addition, a frosted surface is left on the bottle, which can be written on with pen or pencil.

Printing on Leaves

Leaf printing is an interesting pastime for early fall, the printing being done on plants that have a highly colored autumnal foliage. The printing is done by pasting letters or designs, cut from rather thin paper, on the leaves to be printed while the leaf is still green, or before it has shown any great change in color. When the leaf has colored to the desired degree, the paper shapes are removed by soaking in water.



Applying Poultry Netting Properly

To the unexperienced, nothing seems to be easier than to build a chicken run and inclose it with mesh poultry netting, but the job usually lacks neatness. The proper way to apply the netting, according to an expert poultryman, is to attach the top wire first, in a perfectly straight line. When this is done, begin at the bottom of the center post to fasten the lowest wire, and work out to one end. When half of the netting has been secured, the other half is similarly attached, working out from the center.



Motorcycle-Power Catamaran

By P. P. AVERY

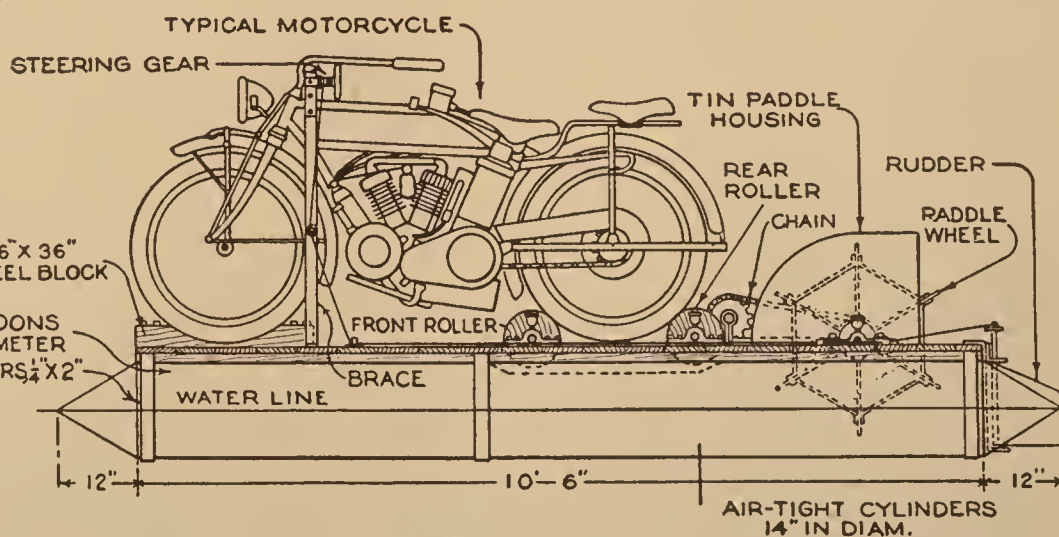
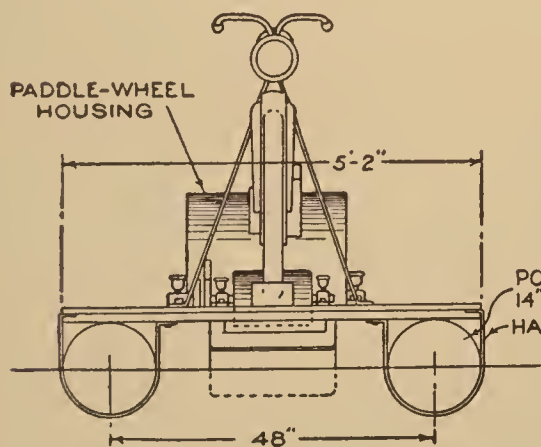
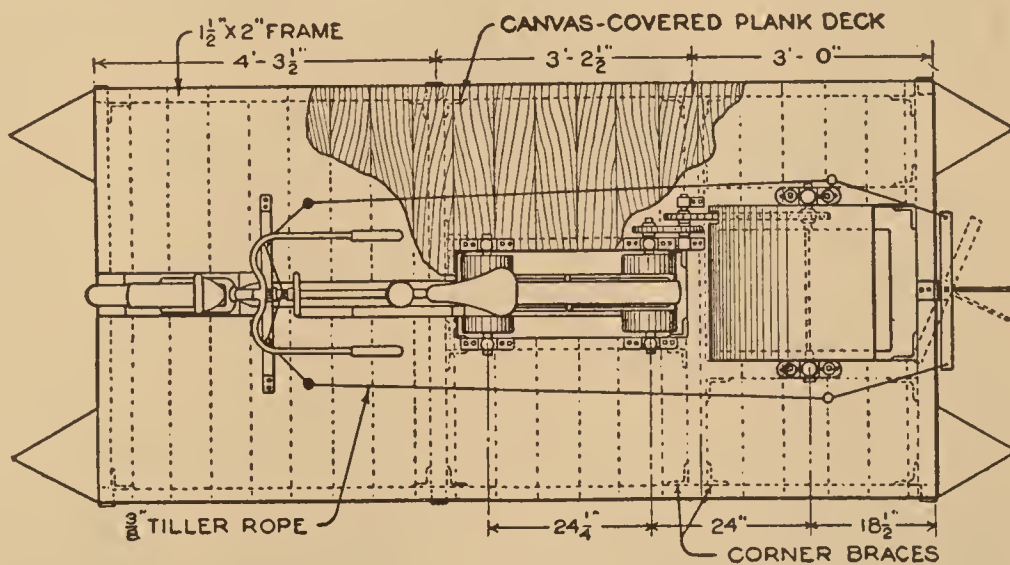
A CRAFT that is particularly valuable in shallow water is a catamaran equipped with a stern paddle wheel and driven by an ordinary motorcycle.

If a catamaran life raft is available, the expense of construction will be eliminated; however, no difficulty will be experienced in building one, as it consists of a substantial wood frame decked with plank and covered with canvas. Additional buoyancy and seaworthiness are given by air-tight metal pontoons underneath each side, as shown in Fig. 1. Openings must be provided in the deck and suitable pieces incorporated in the frame for supporting the power-transmitting rollers and the paddle wheel. All corners of the frame are strengthened with iron corner braces.

The pontoons are attached to the underside of the raft with iron hangers in the manner shown in Figs. 2 and 3. The attachment of the pontoons completes the catamaran proper, and makes it ready to receive the rollers and other parts, which may be found among the materials, used and otherwise, that usually accumulate around the amateur's workshop, but which in any

event, are very easily obtained and comparatively inexpensive.

The wheel block, shown in Fig. 3, is bolted to the center of the deck in such a manner that the front wheel of the motorcycle will be in line with the front edge of the deck. While an assistant holds the machine upright, measurements are taken for locating the wooden rollers that support the rear wheel of the motorcycle and transmit the power of the engine to the paddle wheel. The bearings for the rollers are spaced just far enough apart so that, when the machine is installed as in Fig. 3, the rear wheel will be the same height from the deck as the front one. The locations of the rollers



A Motorcycle-Driven Catamaran Which Is Especially Useful in Shallow Waters; Figure 1 Illustrates How Power from the Motorcycle Engine is Transmitted to the Paddle Wheel, While Figure 2 Shows How the Air-Tight Pontoons are Attached. Figure 3, the Side View, Illustrates the Method of Supporting the Motorcycle and How the Rear Wheel of the Machine Delivers Power to the Paddle Wheel

having been determined, the motorcycle is removed, and the rollers and their bearings are ready to be attached. Both rollers are the same, with the exception that the rear roller has a gear wheel

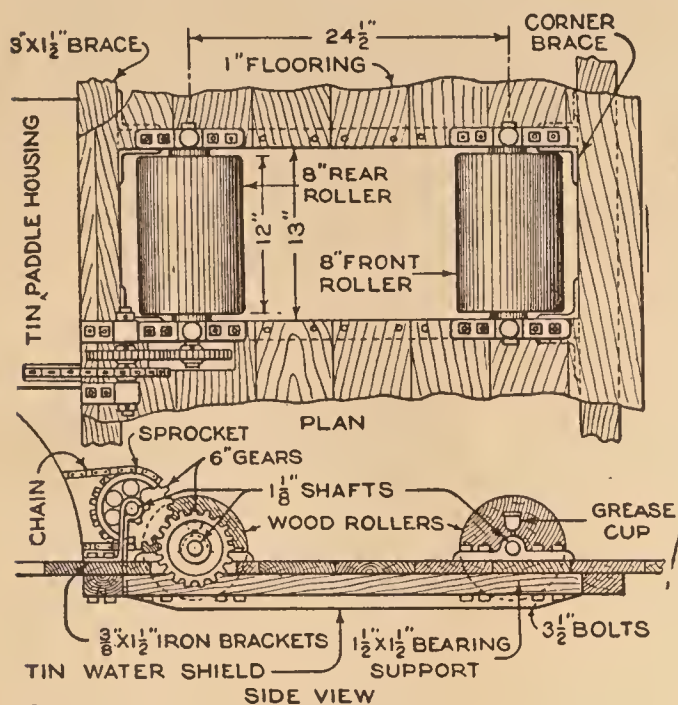


FIG. 4: DETAIL OF ROLLERS, BEARINGS, AND GEARS

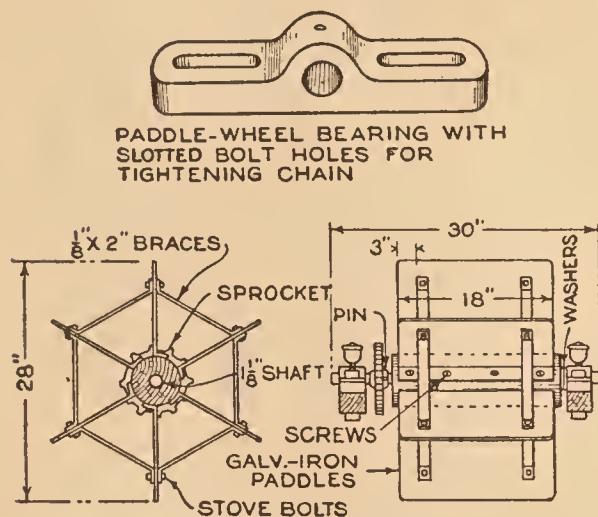


FIG. 5: DETAIL OF PADDLE WHEEL

The Parts Required for the Construction of the Catamaran Are Generally Available and Inexpensive. Figures 4 to 7 Show, in Detail, the Construction and Assembly of the Various Parts

solidly attached to one end of its shaft; this gear meshes with a corresponding gear, immediately behind it, as shown in the detail, Fig. 4. Referring to this detail, it will be seen that the latter gear is mounted on a short shaft, together with a sprocket wheel which should line up with the sprocket on the paddle wheel; this shaft is supported above the center of the gear on the rear roller by the bearing shown in the drawing. Both gear and sprocket wheels are solidly attached to the various shafts by means of pins or keys. Washers are provided on the shafts, between the rollers and their bearings, to prevent side play. When the rollers and transmission gears have been attached, the opening in the deck is covered by a tin water shield which is attached underneath, as shown in Fig. 4, to prevent water from splashing through.

The next step toward the completion

of the craft is the paddle wheel, shown in detail in Fig. 5. A roller similar to the ones described is provided, and a sprocket wheel for the driving chain is solidly attached to its shaft. The paddles are cut

from heavy galvanized sheet iron. One end of each blank paddle is bent at right angles and holes are punched, or drilled, for attaching to the roller with screws. As shown in the drawing, the paddles are separated from each other, and given strength and rigidity by iron braces which are attached with short bolts. The bolt holes of the paddle-wheel bearings, as shown in the drawing, are elongated, so that the paddle wheel may be moved back and forth, to tighten or loosen the chain. A tin paddle housing is made and attached to the deck, as shown in Fig. 3, to prevent the revolving paddle from splashing water on the deck.

The motorcycle is held upright by an iron brace which clamps around the top bar of the machine; the lower ends are bolted to the deck. An extension, at the upper end of this brace, serves to carry the steering gear,

as shown in Fig. 6; the steering wheel and the drum to which it is attached, are carried on a long stud which is secured with locknuts to a U-shaped iron yoke, as shown in the drawing. Holes are drilled through the sides of the yoke, and a similar hole is drilled through the brace to accommodate a suitable bolt. A nut and washer hold the steering wheel and drum in place on the stud.

The remaining detail—a rudder for steering and maneuvering the craft—remains to be installed, and its essential details will be readily understood by reference to the detail in Fig. 7. A simple rudder bracket of flat iron is bolted in the center of the stern; the iron rod which forms the rudderpost is held in place and prevented from pulling out by means of washers and cotterpins. The lower part of the rudderpost is filed flat and drilled for the attachment of the

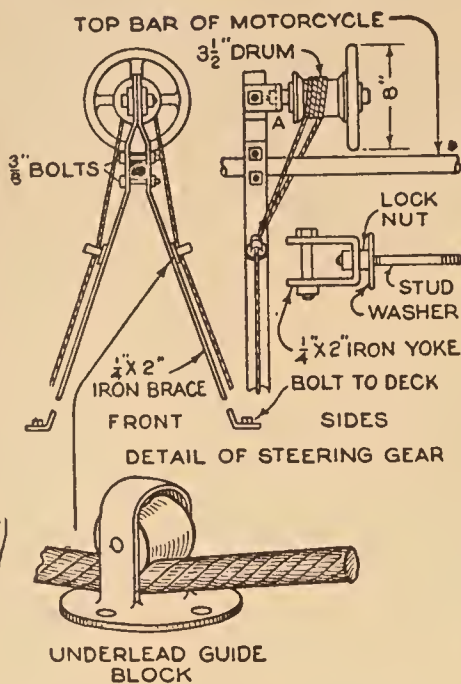


FIG. 6: DETAIL OF STEERING GEAR

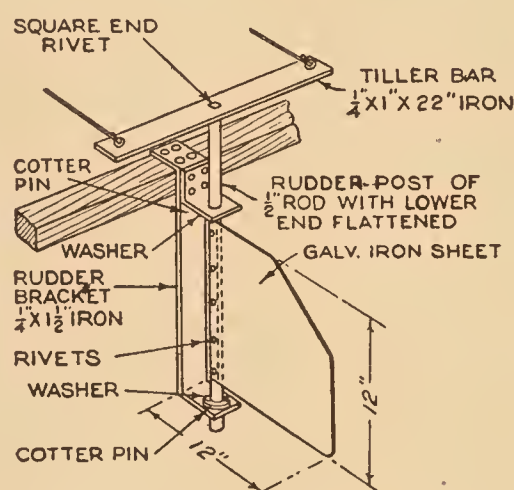


FIG. 7: DETAIL OF RUDDER

rudder proper, small bolts being used for the purpose. The rudder is cut from a piece of heavy galvanized sheet iron. The upper end of the rudderpost is squared off to fit into a corresponding square hole in the center of the tiller bar, to which it is riveted. A hole is drilled in each end of the tiller bar for attaching the tiller rope. This rope runs along the deck, on each side of the motorcycle, to the steering wheel on the brace, suitable guide blocks of the underlead type being used

for holding the rope in its proper location. No alterations of any kind are required on the motorcycle, which is controlled in the usual manner, and the machine may be removed from the raft in a few minutes if it is wanted for shore duty. Various factors control the speed of such a craft, such as the size and weight of the raft and the power output of the motorcycle engine, but given an engine of good power, it is capable of making satisfactory speed in shallow water.

Pillows Made from Cattail Down

A cheap but satisfactory substitute for eider down, now very expensive, can be obtained from cattails, which grow in swamps or along the shores of streams, lakes, or ponds in almost all parts of the country. The heads of these plants should be gathered in the late summer, when they are partly ripe, and the down removed from them with the hands. Pillows filled with this material are extremely light and soft. Their cost is practically nothing.—Forrest Benson, Boulder, Colo.

Bewitched-Cube Puzzle

This simple puzzle, which requires six numbered cubes, will require considerable



FIG. 1: SHOWING FRONT OF THE SIX CUBES IN THE PUZZLE



FIG. 2: PLANE VIEW SHOWING HOW EACH CUBE IS NUMBERED ON ITS SIX FACES

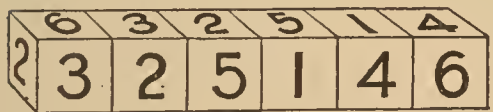
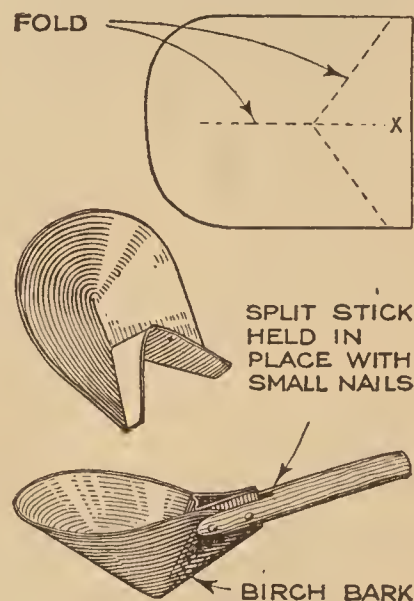


FIG. 3: SHOWING ONE SOLUTION OF THE PUZZLE

The object is to arrange the six cubes in any shape, preferably in a straight line, as in Fig. 3, so that the figures 1, 2, 3, 4, 5, and 6 will appear at once on the top, bottom, front, back, and right and left-hand faces. They will not be in consecutive order, but the six numbers must each show from every side. Separating the cubes slightly will show the right and left-hand faces. When once properly arranged, the blocks may be transposed hundreds of different ways in a straight line, fulfilling the conditions each time.—Dr. L. K. Hallock, Roodhouse, Ill.

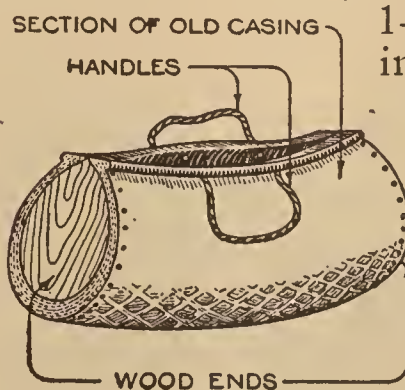
Quickly Made Dipper for Camp Use

When without a dipper or other means for handling water while camping, recourse may be had to an old trick of hunters and trappers, who make serviceable dippers from the bark of trees. A piece of birch bark, stiff paper, or other material, is cut about 8 by 10 in., as indicated. The flat piece is bent longitudinally in the center and then slightly along the diagonal lines. To form the dipper, hold the finger at X and push forward on the material inside the triangle until it assumes the shape shown in the drawing. A split stick is forced over the folds and held in place with small nails or even pins.



Tool Pouch Made from Old Tire

A handy pouch, which will be found convenient for such tools as tire irons, screwdrivers, etc., can be made from a 1-ft. length of old casing. Two pieces of 1-in. board, cut in the shape of a cross section of the tire, are nailed in the ends of the section, as shown. The gap of the pouch will remain closed of its own elasticity; for opening and for convenience in carrying two small holes are punched on each side, and handles of stout twine or wire are inserted. Such a pouch can be thrown into the tool box without danger of its spilling.



Old Gocart Made into Basket Cart and Bassinet

Here is an inexpensive way to utilize the running gear of a worn-out four-wheeled gocart or baby carriage. The body and springs are removed, and an

ordinary clothes basket is fastened to the axles, by



The Running Gear of a Worn-Out Gocart or Baby Carriage is Converted to Further Usefulness by the Addition of an Ordinary Clothes Basket

using two $\frac{1}{2}$ -in. strips, about 2 in. wide and as long as the width of the bottom of the basket. These are placed inside the basket, one at each end, and bolted to the axles with stove bolts through the holes which were formerly used for the spring bolts.

When baby is small, he is given a bassinet made by adding a top to the basket. The top shown in the photograph is made by using parts of four barrel hoops, three

running longitudinally and nailed together at the ends, and the fourth nailed to the other three through the center, to hold them in place and maintain the shape of the hood. Then the whole is covered with blue or pink crêpe and a white curtain net, and a pillow is placed in the basket.

This, without the hood and trimmings, is an ideal place to keep a baby of from one to one-and-a-half-years old, when he is in need of fresh air and his mother is too busy to look after him. On nice days

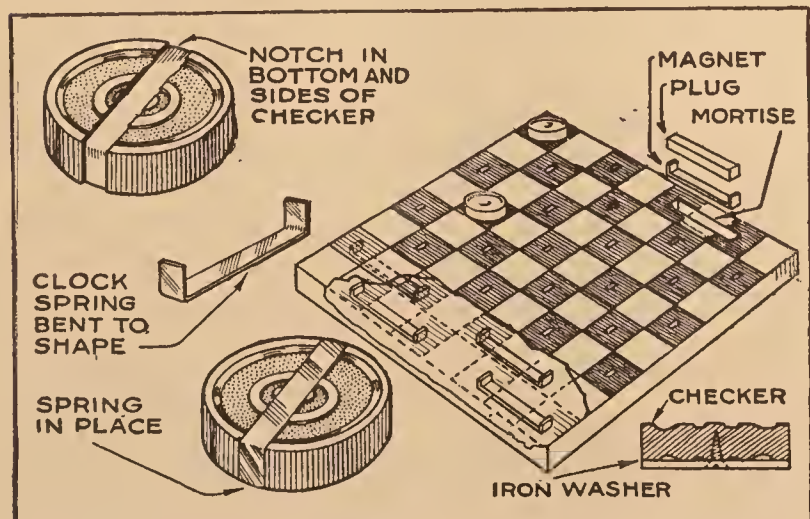
he is placed outdoors in the basket, in which he has room to move about without being strapped in as he would have to be in a gocart or carriage. He can be pushed around by the other children without danger of being tipped over, for the basket sits low on the wheels. Even when baby gets to be older and

can climb out, he is in no danger of a great fall and likes his basket well enough to climb back into it again.

After he has outgrown his "baskart," it is still a convenience to his mother who now pushes her clothes in it from the laundry to the line instead of carrying them, and likewise when she takes them down, she pushes them back to the house again. In this capacity alone the basket is a great saver of strength and time.

Magnetized Checker Men

Anyone who has played checkers knows how easy it is to have the pieces become disarranged, usually at the most interesting point of the game. Two methods of preventing this are illustrated in the accompanying drawing. One of these ideas



Magnetism is Called Upon to Prevent Chess and Checker Men from becoming Disarranged on the Board

requires small magnets made from clock spring, which are attached to the bottom of the checker men. A metal board is required. Three or four of the checkers are clamped in a vise, and grooves are filed on opposite edges and one side, as shown. Some pieces of clock spring of good thickness, but not more than $\frac{1}{4}$ in. wide, are cut into pieces of the proper length and bent to fit neatly and snugly into the filed grooves, and flush with the face of the checker. These pieces are magnetized by bringing them into contact with an ordinary horseshoe magnet. The checkerboard used with these checkers may be an ordinary board with a covering of galvanized iron, or tin plate, on which the squares are painted. Chessmen are fitted with magnets in the same manner as checkers.

The second idea is to imbed the magnets in the checkerboard, and is to be preferred, for the reason that heavier magnets may be used, which makes them

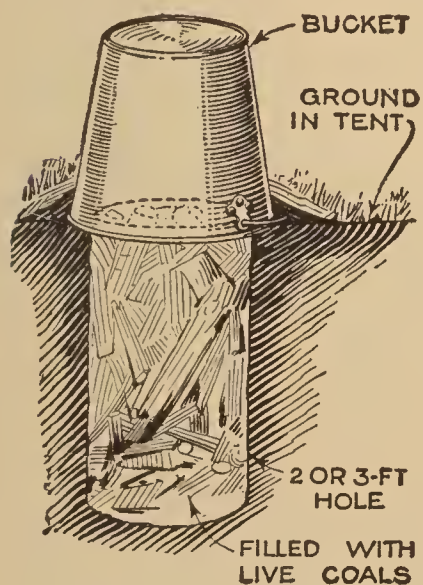
stronger and longer-lived. As shown in the drawing, mortises are cut into the board so that the ends come at the centers of two black squares. The magnets are formed and magnetized in the manner described, and put in place, after which the opening is plugged up with wood to match the rest of the board. After all the magnets have been put in place, the surface of the board is finished smooth, so that the ends of the magnets will just come flush with the top. The checkers are held to the magnets by means of soft-iron washers which are attached to one side with small screws, as indicated.

Marking Glass Indelibly

Indelible marks may be made on china and glassware by using an aluminum pencil. The article is first freed of all grease. The surface is moistened with water and marked as with an ordinary pencil, and must be kept wet during the marking. If the pencil slips, it indicates a greasy spot. Lighter or darker lines are obtained by varying the pressure of the point against the article. The pencil may be made of any small piece of aluminum, which is sharpened to a point.—Henry Hillen, Atlantic City, N. J.

Heating Interior of Tent

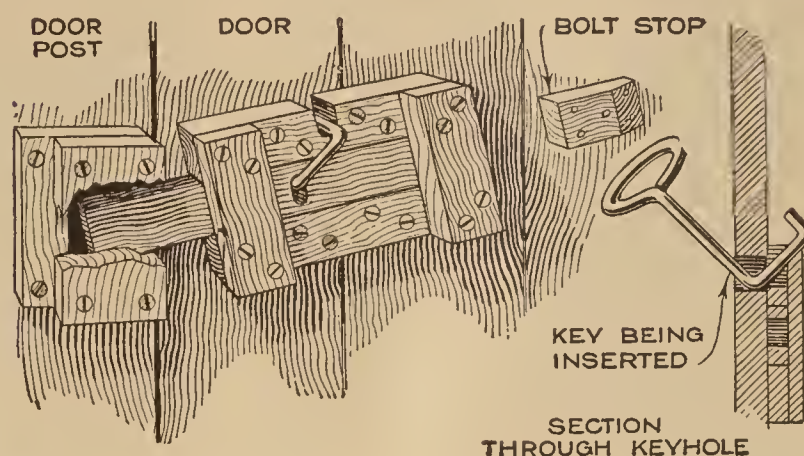
Heating the interior of a tent on a chilly night, or when clothes are to be dried, is usually a matter of considerable difficulty when a stove is unavailable. It is out of the question to light an open fire, as the smoke would be intolerable.



A large metal can, or pail, is inverted on the ground inside the tent, and a mark made around the edge. Inside this circle a hole, 2 or 3 ft. deep, is made. This hole is filled with live coals from an outside fire, and the bucket, or can, is pressed down over the top. Earth may be piled around the edge to make it absolutely smoke-tight. In a short time the tent will be comfortably warm, and the bucket will continue to radiate heat for hours with no danger from fire and smoke.—S. Leonard Bastin, Bournemouth, Eng.

A Homemade Wooden Door Lock

Beyond its fundamental value as a lock, the one shown in the drawing has the added virtue of being less easily picked

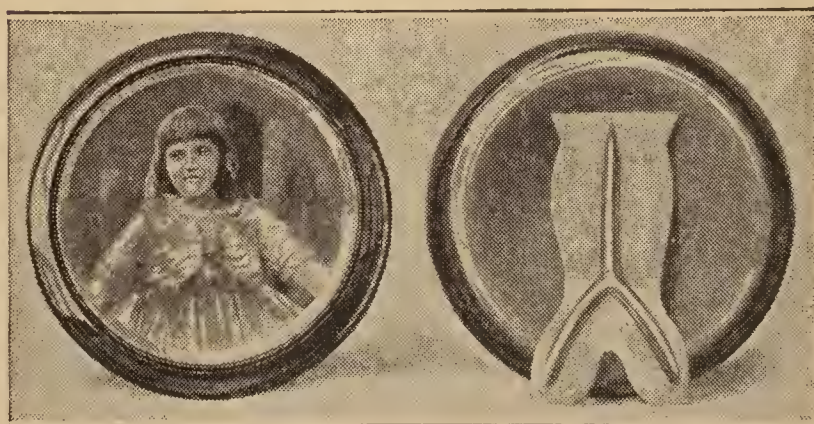


Beyond Its Fundamental Value as a Lock, This One Has the Added Virtue of being Less Easily Picked or Wrecked than Most Padlocks

or wrecked than most inexpensive padlocks. It is made of hard wood. As its size depends on the use to which it is to be put, no dimensions are given. To prevent the bolt from slipping back, as well as to make it more difficult to open by unauthorized persons, the lock is attached to the door at an angle, as shown. The key is made from a piece of iron rod, bent to fit into the hole of the bolt. One end of the key is formed into a loop to afford a good grip.

Watchcase Made into Picture Frame

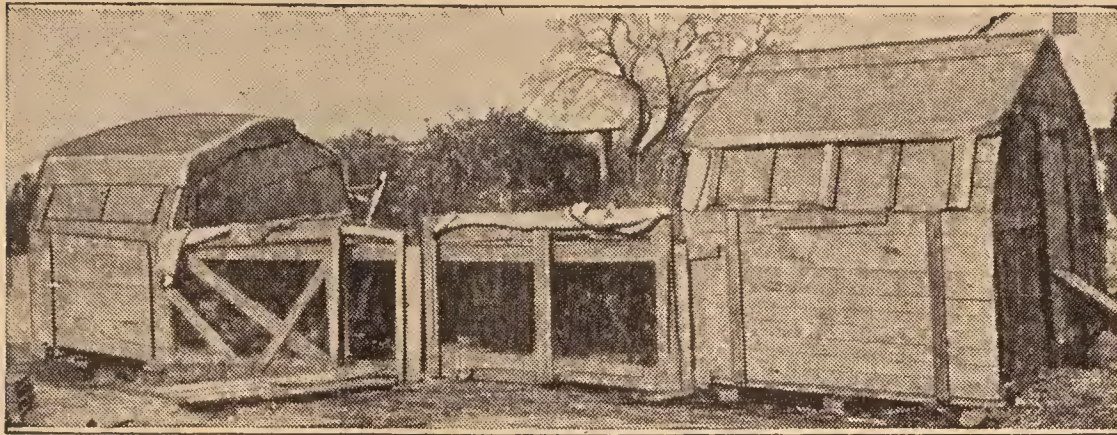
Attractive little picture frames may be easily made from old watchcases. The internal mechanism of the watch is entirely removed from the case, as well as the winding stem. The opening, made by the removal of the stem, is filled with solder. This part of the case should be placed at the bottom, so the soldered opening will be concealed. A piece of tin or wire is soldered to the back of the case, as shown in the photograph, to form a support for the frame. When completed, the picture is inserted and the case joined together in the usual manner.



An Attractive Little Picture Frame can be Made from the Case of an Old Watch

Piano Boxes Make Poultry House

Thirty-five pullets were kept throughout the winter in the poultry houses shown in the photograph, netting their owner a substantial profit above feeding costs.



Thirty-Five Chickens were Kept throughout the Winter in This Snug Poultry House, Which was Built from Four Piano Boxes at a Cost of Six Dollars for the Boxes. A Run, Covered and Faced with Poultry Netting, Connects the Separate Houses

The houses were made by using four piano boxes, set back to back, with roosting and feeding places provided in each to prevent crowding, and the tops and ends were covered with tarred paper for additional warmth and snugness.

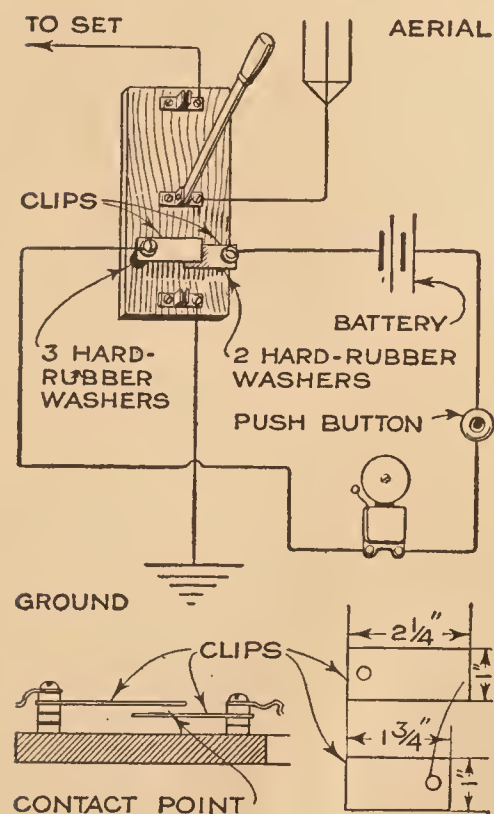
The separate houses were joined by a small run, covered and faced with poultry netting. During cold days and at nights, the run was covered with canvas strips, to keep the rest of the house comfortable. Light was furnished by several panes of glass taken from old window sashes. The total cost of the piano boxes was \$6.—C. M. Baker, Wooster, Ohio.

To Tell When Aerial is Grounded

Aerial grounding switches should always be attached to the outside of the building, and this arrangement is particularly both-

ersome in bad weather, as the operator must open the window or make a trip outdoors to make certain that the switch has been thrown to ground the aerial.

By providing the switch with contact clips and connecting them to a bell circuit in the manner indicated, this inconvenience is eliminated.



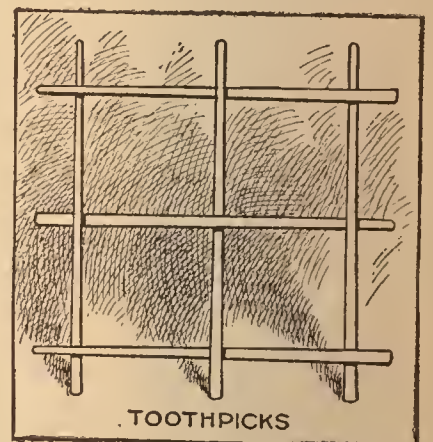
A hole is drilled through the switch base on each side of the knife, midway between the ground clip and the knife base. A small bolt is provided for each hole, and the overlapping spring-brass contact clips are elevated from the base by hard-rubber washers, two being used under the lower clip and three under the upper one. The wires to the bell are soldered to these clips, and brought inside the house, and the bell and button are mounted in some place convenient to

the instrument table. When the aerial is grounded, the contact clips are pressed together by the switch knife. This closes the break in the bell circuit, and to prove the establishment of a ground it is only necessary to press the bell button. If the bell does not ring it indicates the aerial has not been grounded.—F. L. Brittin, Chicago, Ill.

A Toothpick "Bomb"

This particular "bomb" is made from six toothpicks, and is entirely harmless.

The toothpicks are arranged as shown in the drawing. The center slivers put the others under considerable tension, and at the same time hold them together. To "touch off" this bomb, it is held in the hand,



and one corner lighted with a match. As the corner ends are weakened by the flame, the toothpicks will fly apart with considerable force. The experiment should be performed only in a place where there is no danger of fire, and the "bomber" should be careful of his eyes.—Vernon Brooks, Pittsburgh, Pa.

☞ A cream designed to clean imitation ivory will clean the window lights in automobile curtains equally well, as both are made of the same material.

Correcting Faults in Stringed Instruments

By HOWARD GREENE

STRINGED instruments of the banjo and guitar class, after having been in use for some time, not infrequently develop troubles that render them difficult to play, and destroy the accuracy of the scale. For instance—especially when steel strings are used—the heavy pull of the strings may in time cause the neck to warp, so that the fingerboard, instead of being straight and close to the strings at all points, is so curved that the strings are a considerable distance from the board, except close to the peg head. This condition is shown, exaggerated, in Fig. 1 of the illustration. The necessity for pressing the strings such a distance, when fingering, makes playing difficult, and at the same time the tension added to the strings “sharps” the tone. This cannot be cured by moving the bridge, because, if that is done, the notes near the peg head will then be flattened in tone.

Remedying the trouble is rather expensive if it is done by an instrument maker, but any amateur mechanic who will take a little pains, and will work carefully, can do it for himself. Dismantle the instrument, removing the neck from the head. Strip the neck of everything, including the pegs. Sometimes it is possible to remove the fingerboard intact; if it can be done it will save the cost of a new one.

As a rule, however, this is impossible, because the ebony used is a very brittle wood, and the glue is very strong. In any case the fingerboard must come off, and also any veneering that may be under it, so that the wood of the neck itself is laid bare in preparation for the work to be done.

Before commencing this work, it would be well to order the new fingerboard from an instrument maker, giving him the length, thickness, and width at both ends of the old board, the length of strings between bridge and nut, and the diameter of the head. Better still, let him have the

neck before the old board is removed. In any case, insist upon having accurate fretting. The cost will vary a good deal. The minimum price for a banjo-mandolin fingerboard will be somewhere about \$2, and for a full-size banjo about \$4; inlaying the positions and ornamental work will run the cost up higher.

Make the flat surface of the neck perfectly straight and true. Do not try to spring it back to straightness, for it has acquired a set that will tend to return if given an opportunity. Take particular pains to have it true crosswise; it is easy

to get it a little higher in the middle than at the edges, and still easier to round off the edges a little, which is a mistake to be avoided. See that there is no twist from one end to the other. If the neck is a little weak at one end, remove as little wood as possible there, taking off as much as necessary at the heavy end and in the center. Cut



FIG. 1: WARPED NECK

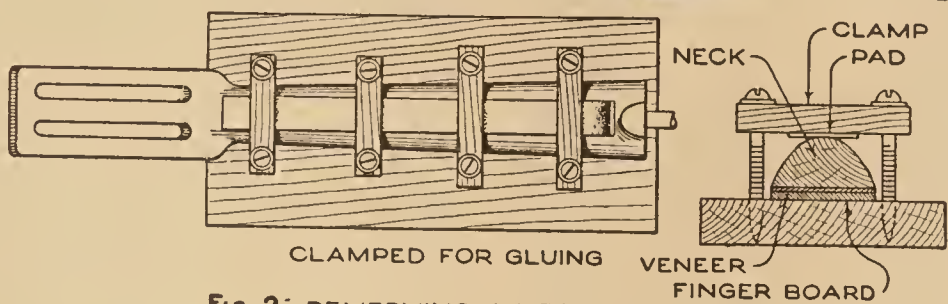


FIG. 2: REMEDYING WARPED NECK

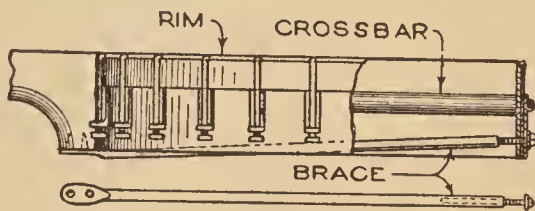


FIG. 3: BRACE FOR BANJO

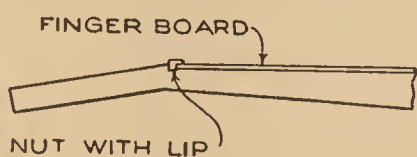


FIG. 4: MOUNTING LIP NUT

The Player of a Stringed Instrument, If He Has a Moderate Amount of Mechanical Skill, can Take Care of Most of the Disorders to Which These Instruments Are Subject

new strips of thin wood to replace the veneer removed, if there was any. If not, put on a strip of veneer anyway, to add more stiffness.

Hard maple is a good wood for the purpose. The strip must be perfectly true as to thickness, from end to end; $\frac{1}{16}$ in. added to the total thickness of the neck will do no harm.

Glue the veneer in place, clamping the neck, flat side downward as in Fig. 2, on a heavy board that is carefully trued up on the surface. If no clamps are available, cut wood cleats and screws or bolts, as shown in the sketch. Apply heavy pressure. Put a piece of paper between the veneer and the board, so that they will not stick together with glue that runs out of the joint. Let the job stand at least three or four days, to dry very thoroughly. Then put a straightedge on the veneer surface, and make sure that it is true. Carefully trim the edges flush with the neck. Glue on the new fingerboard in the same way, taking great pains

to have it in the proper place, edges flush, and the small end exactly where the old board terminated. Cut a number of strips of heavy cardboard, a little thicker than the height of the frets, and place the strips between the frets so the latter will be kept clear of the clamping board. Let it dry for several days.

If the neck is now thicker than it was originally, a new nut will have to be made, unless the old one can be used by putting a shim of wood under it, to bring it up to the proper height. Ebony, ivory, and bone are good materials for making nuts. A new bridge of the proper height will take care of any extra neck thickness, so far as the head end is concerned.

A banjo or banjo-mandolin, or similar instrument, that is weak and tends to give where the neck joins the head, can be greatly improved by putting on a brace reaching from the heel to the diametrically opposite point of the rim, as shown in Fig. 3. There are several ways in which this can be done, but a description of one method will convey the idea clearly. Get a piece of brass tubing, 2 or 3 in. longer than the outside diameter of the head, and about $\frac{3}{16}$ in. in inside diameter. Flatten one end into a neat "palm," which is to be fastened to the heel with carefully countersunk brass screws. Cut off the other end of the tube so that it will reach within $\frac{1}{4}$ in. of the inside of the rim. Tap the tube to take a long machine screw; the size of the tap and screw will of course depend upon the exact inside diameter of the tube, but if a good long screw is used it is not necessary that there should be a full thread. Drill the rim so that the screw can pass through, and use a small washer between screw head and rim; both screw and washer will look better if nickelplated. The proper tension is obtained by turning the screw. Be careful not to make it too tight, or the rim will be strained. This arrangement not only greatly stiffens the instrument, but in some cases appreciably improves the tone.

If the neck is set in the rim so that the fingerboard forms a very obtuse angle with the head, causing the strings to stand far above the frets, make a new hole for the screw that enters the end of the crossbar reaching from the neck across the rim, placing the hole closer to the head. The part of the neck that abuts against the rim must be trimmed carefully to suit the new angle; otherwise the rim will be strained at the lower edge, and the neck will not sit firmly in place.

Make sure, however, that the trouble is not due to a warped or bent neck, for in this case the change of angle will do more harm than good.

Occasionally an instrument is found in which the distance between the nut and the first fret is too great, though otherwise the scale is accurate. Remedy this by making a new nut with a slight lip on the fingerboard side, as shown in Fig. 4. Make the lip rather wide to start with, and adjust it by trying the scale with a single string, and cutting down the lip until the tone is accurate.

The old-fashioned plain pegs are a nuisance, and it is well worth while to replace them with a set of friction pegs, which can be inserted in the same holes, with, perhaps, a little reaming. The friction can be adjusted by means of a screw at the end of the peg. In the case of an ordinary banjo with five strings, the fifth-string peg will have a little rib, for which a groove must be made in the hole. Make the groove with a narrow-bladed knife, or with a small three-cornered file. See that the peg housing fits firmly in the hole; otherwise it will wiggle about when the peg is turned and be a source of trouble.

It is a good plan to rub steel strings with a soft cloth with a trace of vaseline on it. The strings rust easily in damp weather and acquire a roughness that is disagreeable and impairs the tone.

The worm pegs of guitars, mandolins, and the like, require attention if they are to give satisfaction. They carry a pretty heavy strain, and the bearings and the worms should be lubricated with a little vaseline. This makes a surprising difference, not only in the turning but in the length of time they will stay in good condition. This is particularly true of the steel-strung guitar.

Never tighten the head of a drum-headed instrument in damp weather. The calfskin absorbs moisture very readily, and becomes slack, but it dries out quickly too, and if tightened when damp, it is very likely to break from the strain when it dries out. In tightening, turn the nuts a very little at a time, going round and round several times if necessary. This is to keep the tension as equal as possible and avoid splitting the head.

The "steel" used with the Hawaiian guitar is usually nickelplated, and the plating on the playing edge often flakes off. If such a tendency is observed, rub the edge lengthwise on a piece of fine emery cloth placed on a flat surface until the nickel is removed. Finish on a piece of well-worn, fine emery cloth with a

little oil on it; this will give a very smooth and satisfactory surface. Many players like to wind the steel lengthwise with friction tape, covering all but a strip, $\frac{1}{4}$ or $\frac{3}{8}$ in. wide, along the playing edge. The idea is to afford a more comfortable grip with minimum pressure from the fingers.

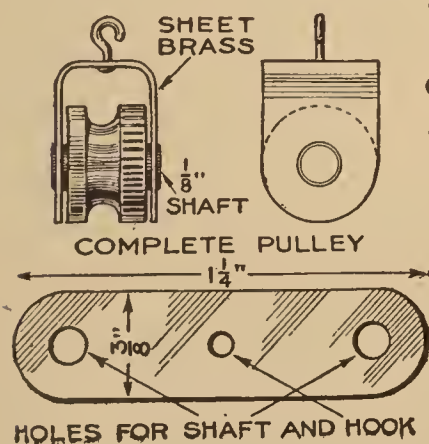
In a Hawaiian guitar where the bridge is glued direct to the wood of the top and carries the strings without the aid of a tailpiece, keep an eye on the bridge to see that it does not pull off. As a rule the first indication will be a lifting of one of the back corners, and this will spread. Have it reglued by a competent instrument man. The height of the nut puts a heavy strain on the bridge, and unless the gluing is well done, the glue will not stand. In an obstinate case, the bridge may be secured with three or four small brass screws, but it is better, for the sake of the tone, to avoid the screws.

Starting a Screw with a Bit Brace

When putting up a number of outlet boxes on an electric conduit job, it was found that the $\frac{3}{4}$ -in. screws used for attaching the boxes were very hard to start into a drilled screw hole. The man doing this work took a screw of the same diameter as the ones used, but longer, and squared the head off with a file to fit the chuck of his bit brace. This tool was used to make the screw holes, and it was found that the screws could be started without difficulty into the threaded holes. —S. A. Asquith, Los Angeles, Calif.

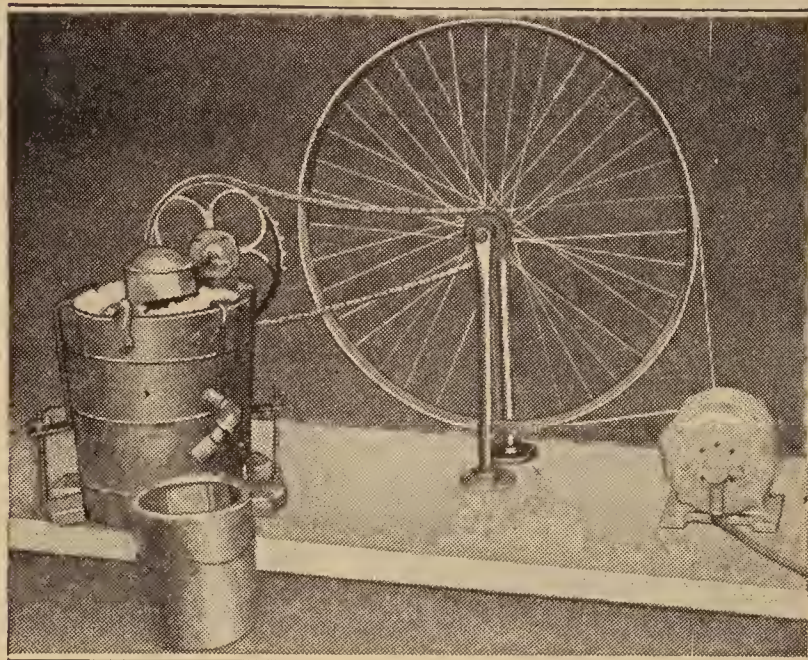
Pulley for Toy Machinery

When making models, small derricks, cranes, etc., it is sometimes difficult to secure the necessary pulleys, and in such cases the binding nuts from old dry cells prove to be of assistance. A small strip of sheet brass, or other metal, is cut to the dimensions shown, and provided with three small holes for the shaft ends and hook, as indicated. The strip is bent into the form of an inverted "U," and a shaft is provided for the binding-nut pulley to turn on. These nuts make excellent pulleys for small engines. —Geo. E. Perkins, S. Bound Brook, N. J.



"Churning" the Ice-Cream Freezer

The delights of homemade ice cream would be more frequently enjoyed were



An Old Bicycle Furnishes a Power-Transmission System for Running an Ice-Cream Freezer by an Electric Motor

it not for the time and labor required to turn the freezer. The photograph shows how this work was eliminated in one instance by the use of an electric motor from a washing machine. A rear wheel from an old bicycle was supported on $\frac{1}{2}$ -in. pipe brackets which were screwed into floor flanges at the lower end, these in turn being screwed to a wooden base. The upper ends of the pipes were flattened and drilled to receive the axle. The freezer was then secured to the base with clamps, as indicated in the drawing, and the handle was exchanged for the bicycle sprocket wheel. The two sprocket gears were connected by a bicycle chain and the whole driven by the motor by means of a belt passing around the bicycle rim.

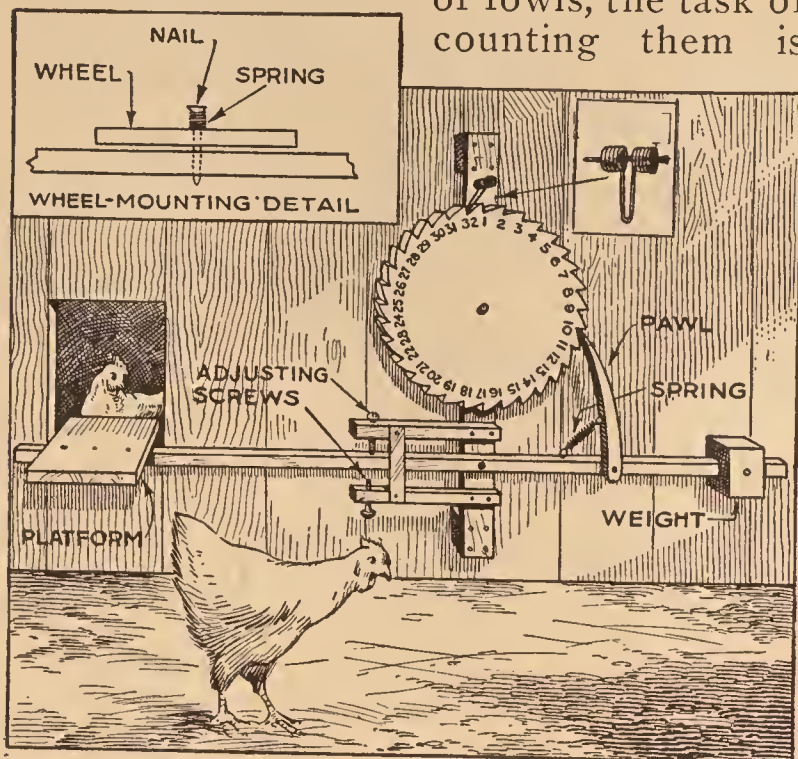
A motorist utilized one of the rear wheels of his car for the same purpose. He jacked up both rear wheels of his car and placed his freezer beside one of them. The crank handle was wrapped with cloth to prevent scratching the finish and placed between two of the spokes. Weights were laid around the freezer to prevent its being moved or overturned by the revolving handle, after which the engine was started.

Substitute for Inner Gas Globe

An inexpensive substitute for the inner glass globe on drop gas lamps consists of a small plate of glass, about $2\frac{1}{2}$ in. square. This plate is placed inside the larger gas globe, and rests directly over the ventilating opening at the bottom while permitting air circulation.

Counter Takes Census of Poultry

There are times when the poultryman wants to know whether any of his flock is missing. If he has any great number of fowls, the task of counting them is



A Census Enumerator for the Poultry House Takes a Count of the Flock at Morning and Evening

no simple one and is complicated if the birds are of the same breed and color.

The drawing shows a counter that is attached to the door of the poultry house so that each bird as it passes through the opening counts itself. The teeth on the wheel are cut about $\frac{1}{2}$ in. apart and $\frac{1}{4}$ in. deep, so that a wheel 8 in. in diameter will take about 50 teeth, while a $5\frac{1}{8}$ -in. diameter will allow 32 teeth. A long arm is pivoted in line with the center of the wheel; one end of this arm has attached to it a small platform on which the bird must step to leave the house. A sliding weight, and the pawl which actuates the toothed wheel, are mounted on the other end of the arm. The pawl may be of wood or metal, and is so attached that it will move the wheel the distance of one tooth. A light spring holds the pawl in contact with the rim of the wheel. The weight is balanced so that the platform end of the arm will be pressed down under a weight of about 1 lb. A piece of wood, about 10 in. long, is fastened on each side of the arm, and a large screw is placed in the outer end of each piece as shown, for the purpose of regulating the movement of the lever after the proper adjustment has been determined by experiment. To prevent the wheel from turning backward, a stop made from a piece of stiff wire is attached with a nail above the center of the wheel.—J. O. McDonnell, Toronto, Ont.

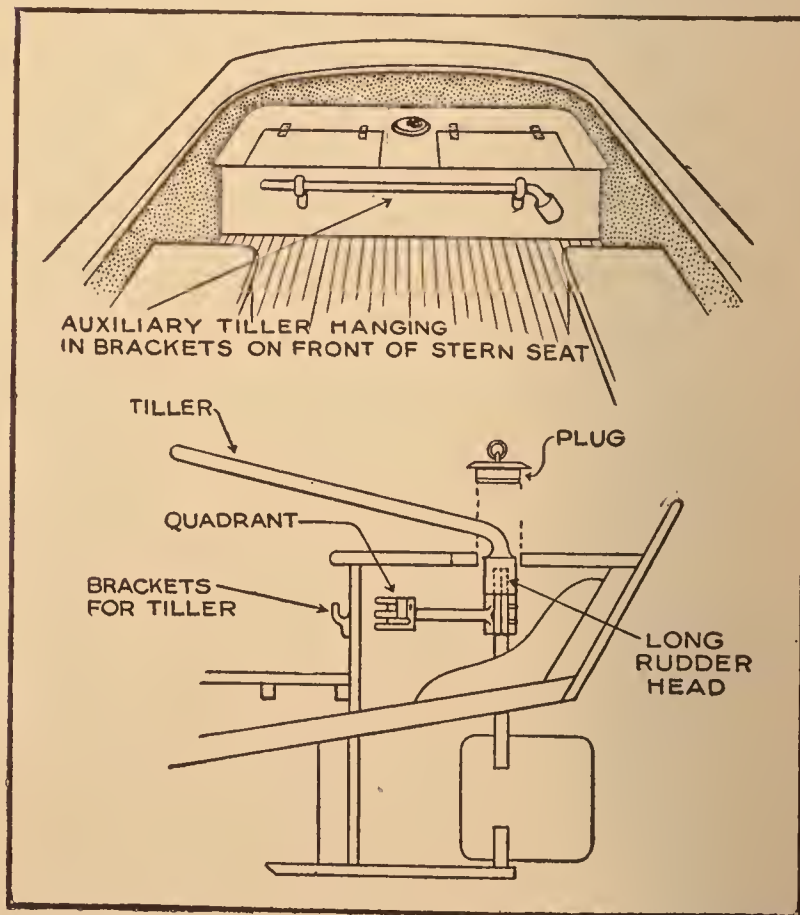
"Perpetual" Soap Bubbles

A soap bubble that lasts indefinitely may be formed by the following method: Place 2 oz. of distilled water into a 6-oz. bottle. Put the bottle in a pan of water on the fire, and heat until steam issues from the bottle, then add a piece of soap, about the size of a pea. Remove the bottle from the pan and immediately cork it, pressing the cork in firmly, and finally covering it thickly with sealing wax. To get the bubble, hold the bottle horizontally, and give it a sudden upward movement. This will throw the liquid over the inside of the bottle, leaving a film of the soapy solution behind. As the liquid drains to the bottom of the bottle, a bubble forms in the upper part which will last indefinitely.

Auxiliary Motorboat Tiller

In event of the tiller rope breaking in a busy fairway or crowded anchorage, the possibilities of accident are large, and since the arrangement of the average steering control is under cover, where it is impossible to reach and repair it quickly, the addition of some auxiliary steering device is the part of wisdom.

The drawing illustrates how such an auxiliary steering arrangement for use in emergency is applied. The rudder stock is made sufficiently long to extend about 2 in. above the steering quadrant, and this extension is squared off to accommo-



An Auxiliary Tiller, for Use When the Tiller Rope Breaks, Reduces the Danger of Damage and Accident to Boat and Occupants

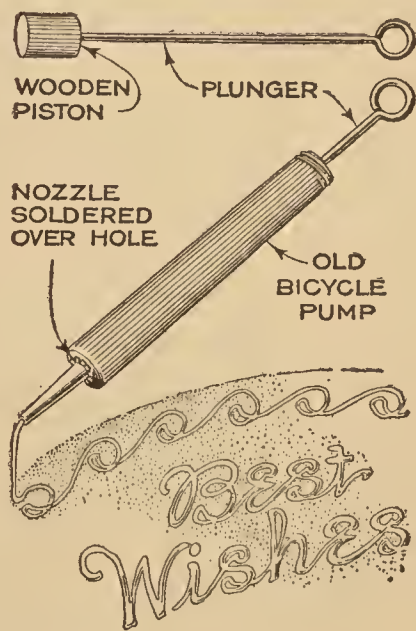
date the handle, something after the manner of a socket wrench. A hole, about twice the diameter of the rudder stock, is drilled directly above, and a plug is provided to keep out dirt and water. Two brackets on the front of the stern seat hold the tiller, ready to be seized at an instant's notice and dropped into place. —Wm. F. Crowell, Providence, R. I.

Drill Stop Formed of Friction Tape

In small shops, where a large number of drill sizes are used at infrequent intervals, it is not always profitable or possible to carry the variety of steel collars required for depth stops. On a job requiring the countersinking of a large number of holes of different sizes on marble switchboard panels, a satisfactory drill stop was made by wrapping the drill at the proper point with 10 or 12 thicknesses of ordinary friction tape. —Arthur F. Cox, Chicago, Ill.

Pump for Decorating Cakes

Decorating cakes and other pastry with ornamental designs in sugar icing is simply done with the "gun" described, and the results are limited only by the artistic ability of the operator.

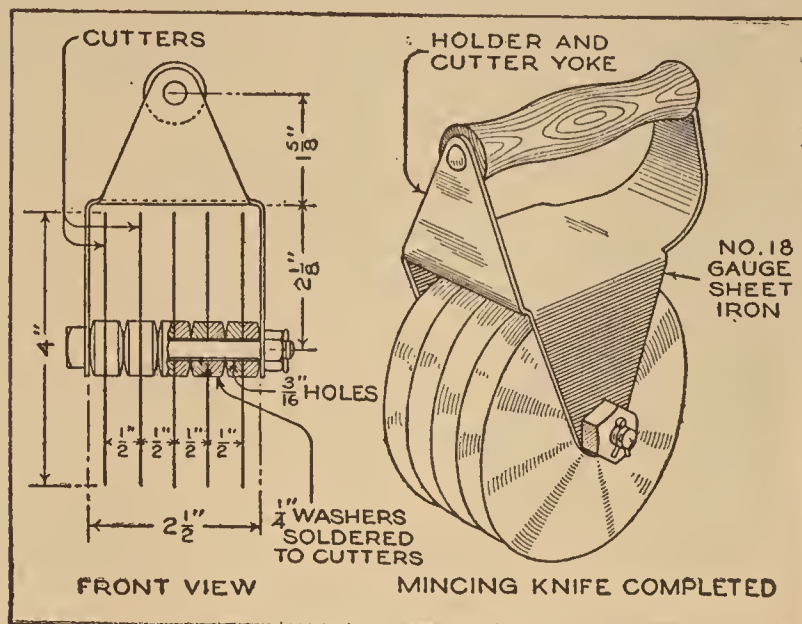


The cap and plunger of an old hand bicycle pump are removed and discarded, and a hole, about $\frac{1}{4}$ in. in diameter, is drilled in the center of the closed end of the cylinder. Over this hole a tapered tin nozzle is soldered. A new plunger is made from a piece of stiff wire, which has an eye turned at one end, and a small wooden piston at the other. This piston should fit the inside of the pump cylinder neatly.

To use the device, the plunger is removed, and the cylinder filled with the icing to be used. Holding the pump in the left hand, the plunger is replaced, and a slight downward pressure forces the icing from the nozzle in a thin stream. By manipulating the pump in this manner any design may be applied. The flow of icing from the nozzle ceases as soon as pressure on the plunger is removed.

Rotary Mincing Knife

A rotary mincing knife, such as the one described, will be found considerably more convenient and efficient than the



A Mincing Knife with Rotary Blades Increases the Output and Adds to Convenience

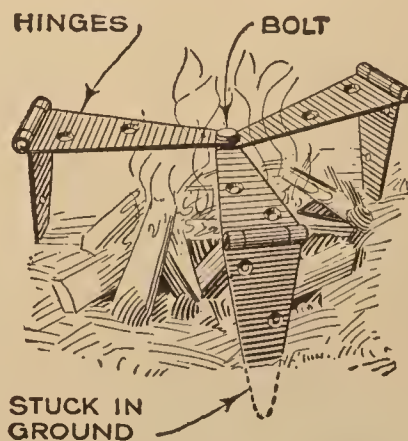
ordinary chopping knife having but one or two blades.

The cutters, five in number, are made of saw steel and drilled at the center for a shaft. Saw steel is mentioned, as the thinner and harder the material for the blades, the less sharpening will they require. A brass or iron washer is soldered to each side of the separate blades, to form a broader bearing surface on the shaft.

After the holder and cutter yoke have been made, the disks are assembled on the shaft. By making the shaft from a long bolt and having a cotter pin through the outer end, it is possible to remove the cutters for cleaning. —C. A. Pease, Monrovia, Calif.

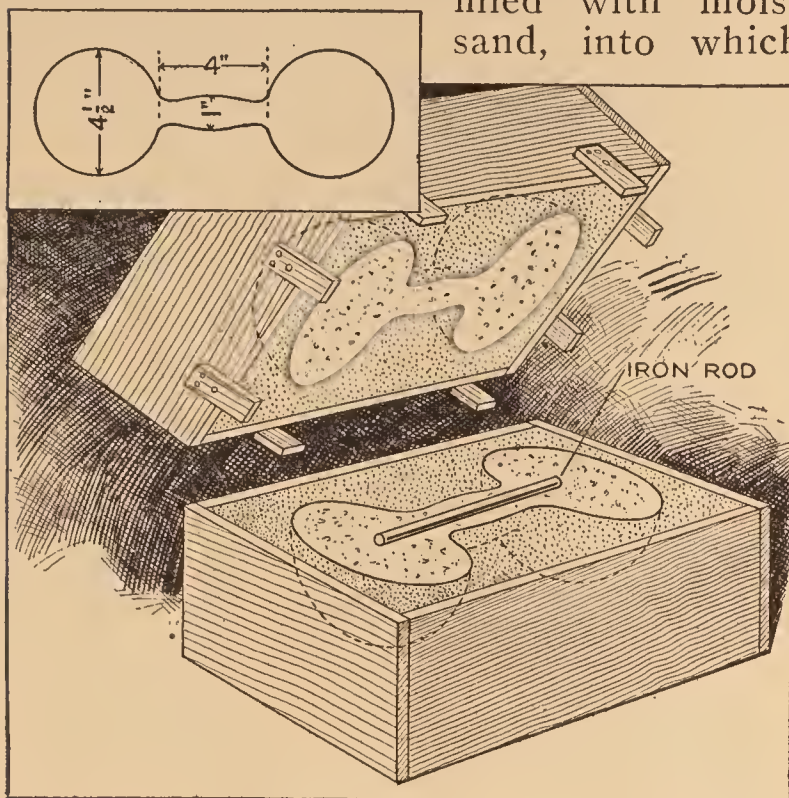
Camp Stove Made from Three Hinges

The novel camp stove shown in the drawing is made from three common strap hinges. The hinges are fastened together at the center ends with a small bolt, and the other ends are sunk into the ground. The bolt should be flat-headed, and should be screwed up tightly to make the hinge supports as rigid as possible. This stove may be folded up when not in use, and occupies but little space in the camping equipment.



Dumb-Bells Made of Cement

Dumb-bells of any weight and size may be made with little trouble from ordinary cement. Two mold boxes are made and filled with moist sand, into which



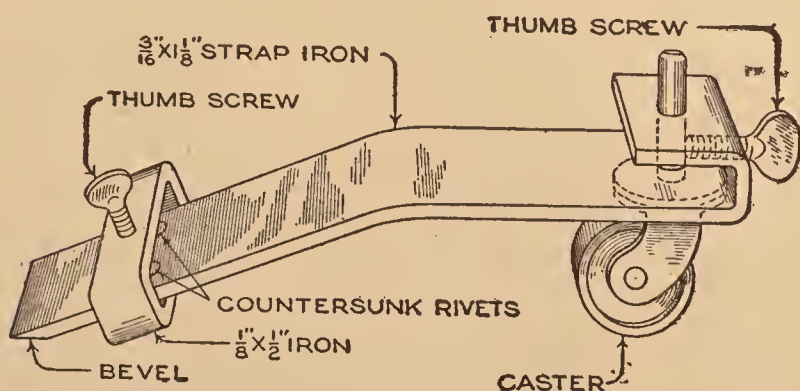
Dumb-Bells Cast in Sand Molds may be Weighted to Meet Individual Requirements of Age and Strength

the pattern is pressed. After removing the pattern, the mold is thoroughly greased with heavy oil or light grease, to prevent the sand from sticking to the cement. The mold is then filled with cement mortar. Before the cement has completely hardened, a small iron rod is placed on the lower mold, as a reinforcement for the handle. The molds are then placed together, until the cement has completely hardened.

A dumb-bell made to the dimensions given will weigh approximately 10 lb. Heavier or lighter bells may be made by imbedding suitable-sized pieces of wood or metal in the ends.—G. Goodwin, Oshawa, Ont.

Holder for Sharpening Plane Irons

To sharpen plane irons and chisels, and give them a true, unrounded bevel at the



Beginners Who Have Difficulty in Holding Plane Irons and Chisels at the Proper Angle on the Stone will be Aided by This Device

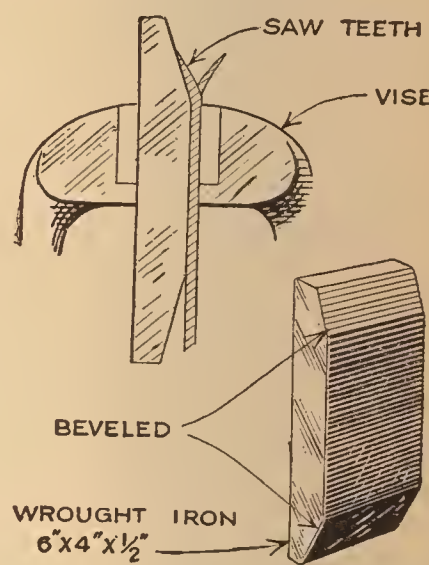
cutting edge, a holder such as shown in the sketch will be of use. It is adjustable, so that it may be set to the bevel already given irons.

Bend to shape two pieces of strap iron, as illustrated, and drill the holes required, for a caster, two thumbscrews, and two rivets. Rivet the short piece to the long one; the opening should readily admit any ordinary iron or chisel. The upper ends of the rivets are countersunk, so as to come flush on top, and the edge of strap iron is beveled as shown. In use, the caster rolls over the surface of the stone, and holds the edge to be sharpened at the proper angle.

Iron Block for Setting Saws

The iron block shown in the drawing will be found very useful for setting both hand and circular saws. It is made of wrought iron and has one or more of its edges beveled at an angle that will best conform to the pitch of the saw teeth.

The block is clamped in the vise with the saw, as shown, so that the edge of the bevel is on a line with the base, or root, of the teeth. The proper amount of set is obtained by bending the teeth over against the bevel of the block. For the purpose of illustration, the set shown in the drawing is intentionally exaggerated.



Old Wringer Deflates Inner Tube

A handy time and labor saver, for the garage or tire-repair shop, is an inner-tube deflater, made from an old clothes wringer. Instead of the strong, stiff springs generally used, lighter and weaker ones are substituted. To deflate the tube, it is picked up by the valve stem and the tube allowed to hang. Grasp it at the bottom, insert this part between the rollers, and turn the crank, as when wringing clothes, meanwhile pressing down on the valve core. When the tube has been run through as far as the valve, the crank is turned in the opposite direction and the tube is removed, free of air and in perfect condition to be packed away.—H. M. Scherer, Rush Hill, Mo.

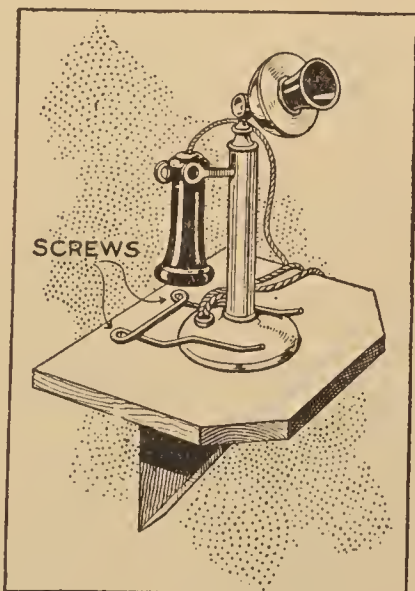
Mounting Photos in Watch Covers

Nearly everyone who has ever attempted to place a photograph in the cover of a closed-face watch, has learned, usually at the expense of a broken crystal, that there is not sufficient clearance between the cover and the crystal for the thickness of the average photographic print.

Such a picture, even though it is printed on unusually heavy paper, may be easily reduced in thickness for mounting in the watch cover by the following method: Cut out the picture to the diameter that will fit the watch cover. Wash the hands thoroughly, and then lay the picture, face downward, on a piece of clean blotting paper. Dip the forefinger into a cup of clean water and then gently rub the back of the print. After a little rubbing the paper will begin to soften, and roll up under the finger and flake off. This rubbing should be carefully applied over the whole back of the print. To observe the amount of paper that is being removed, the picture should be held with the back toward the eye, against a strong light. This will reveal the thin places, and further removal of paper should then be confined to the thick spots. In a few minutes, the heaviest print can easily be worked down to such a thickness that it will go into the watch cover without even touching the crystal.—John Edwin Hogg, Los Angeles, Calif.

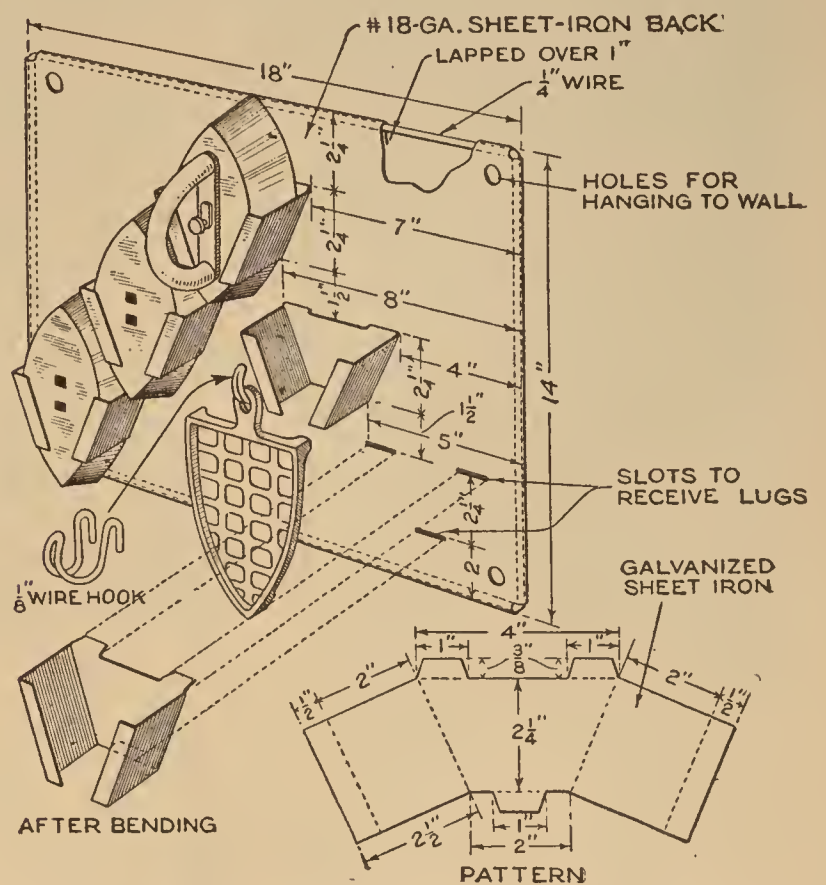
Spring Keeps Telephone in Place

Where a desk telephone is set on a small shelf, as in a factory, the instrument is not infrequently knocked off, and possibly broken. After several accidents of this kind had more or less completely disabled the phone, means were sought to prevent a repetition. A spring, such as shown, was made of $\frac{1}{8}$ -in. stiff steel wire and attached to the shelf with two wood screws. The base of the telephone slips between the prongs of the spring and prevents it from being accidentally knocked off by someone's brushing past it.—Chas. Ward Magnat, Jr., Paterson, N. J.



Holder for Flatirons

Keeping a set of flatirons where they will be convenient and, at the same time, out of the way, is a problem in homes not



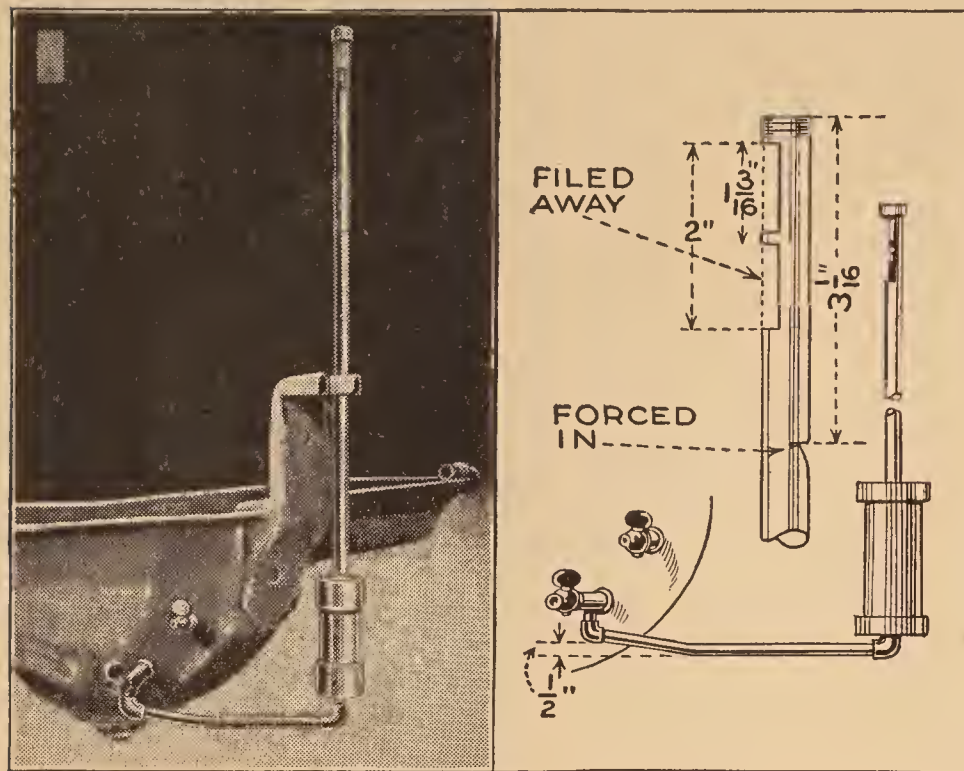
Keeping a Set of Flatirons Where They will Be Convenient, and at the Same Time Out of the Way,
is Simplified by This Easily Made Holder

provided with electric irons; the trouble is complicated by the weight and shape of the irons. However, as the drawing shows, a neat and substantial holder can be easily made from heavy sheet iron; such a holder is attached to the wall, or the back of a door. As shown, the edges of the back are lapped over a piece of stiff wire, both for strength and to provide a small air space between the holder and the wall. A pattern is made; the holders are cut from flat sheet iron, and later are bent to the shape shown. To accommodate the holders, short horizontal slits are cut into the back with a cold chisel, and the lugs of the holders are inserted and bent down upon the back. A hole is drilled or punched at each corner, for hanging the device. The iron stand is kept along with the irons, hanging on a stout hook. One of the advantages of such a holder is that the irons may be put away while still hot without interfering with other operations.

¶ To deaden the noise of steam while blowing off through a wrought-iron standpipe, enlarge the end of the pipe like a funnel, until it is about four or five times as large as the original pipe. To work well, the pipe should be about 20 or 30 times as long as the original diameter.

Handy Oil Gauge for Light Car

Keeping the proper amount of oil in the crankcase at all times becomes a very



A Handy Oil Gauge for a Popular Car, Mounted on the Dash, Reminds the Driver of the Amount of Oil in the Crankcase

simple matter when an oil gauge, mounted on the dash in full view of the driver, is used. The gauge shown in the drawing, which can be made at very small cost, has been found to be accurate and substantial, and has given entire satisfaction.

A piece of $\frac{1}{4}$ -in. brass pipe, about 20 in. long, threaded on both ends, is cut and filed as shown. A portion of pipe below the small cut is bent in to hold a glass tube which must fit exactly in the bore. This cut also serves as an air vent to allow the oil in the gauge to rise to the same height as that in the crankcase.

A $1\frac{1}{4}$ -in. nipple, $3\frac{1}{2}$ in. long, which is used as a float chamber, is fitted with two caps, each being bored and tapped in the center, the top one to receive the brass pipe and the lower one a $\frac{1}{8}$ -in. elbow. Then a length of $\frac{1}{8}$ -in. pipe, a tee, and another elbow are used to connect the float chamber to the crankcase at the lower-petcock hole; the cock is removed and screwed into the end of the tee. All joints should be made oil-tight, when the gauge is finally assembled, by applying red lead mixed in linseed oil, to the threads. The iron pipe must be bent approximately as shown, so that the lower cap of the float chamber is slightly below the petcock and just in front of the right crankcase arm. The brass pipe must be perfectly vertical and close against the dash, to which it is attached with pipe clips. All parts of the gauge should be fastened securely, so as to prevent undue vibration.

A piece of No. 12 aluminum wire, 2 ft. long, is taken, and one end fastened securely into the center of a cork, $1\frac{1}{8}$ in. in diameter. After the cork has been well shellacked and dried, it is placed in the float chamber so that the wire extends vertically in the brass pipe. Oil can then be poured into the crankcase until it rises high enough in the float chamber to just raise the cork. The top of the wire should now be cut off so that $\frac{1}{4}$ in. will show at the bottom of the glass tube. This is to indicate the lowest safe oil level. The end of the wire can be colored with some bright paint. When this colored portion is near the center of the glass, it indicates that the correct amount of oil is in the crankcase, and when it reaches the top of the glass, shows that the oil has reached the level of the upper petcock. The oil level should never be allowed to get below the middle point.—Edmund D. Haigler, Watertown, Mass.

Fence Wire as Concrete Reinforcement

Finding it necessary to provide a safe place for his gasoline and coal-oil tanks, so as not to increase the rate of insurance on adjoining property, a progressive Iowa farmer used woven fence wire for reinforcement in the concrete walls and roof of the structure, and found this to be just as satisfactory as the much more expensive reinforcement that he had used previously in similar work. The strength of the concrete reinforced in this way is shown by the fact that there is not a crack in the roof, although it was made over 15 years ago, and is only 3 in. thick.

A water tank, eight years old, similarly reinforced with a liberal quantity of woven wire and old iron rods, also has proved to be very strong, as not a crack can be seen in it, while other concrete tanks, built later, and not reinforced in this way, are cracked and useless.

The crumbling stone wall of one of the barns was renewed in a similar manner. A trench was dug outside of the old wall, and a form, made of boards, was built, as high as the wall and 3 in. from it. After having inserted three thicknesses of woven wire, on edge, into the form, it was filled with thin concrete. The top of the concrete was then beveled away so as to carry off the rain.—Ed. Henderson, Lake Mills, Ia.



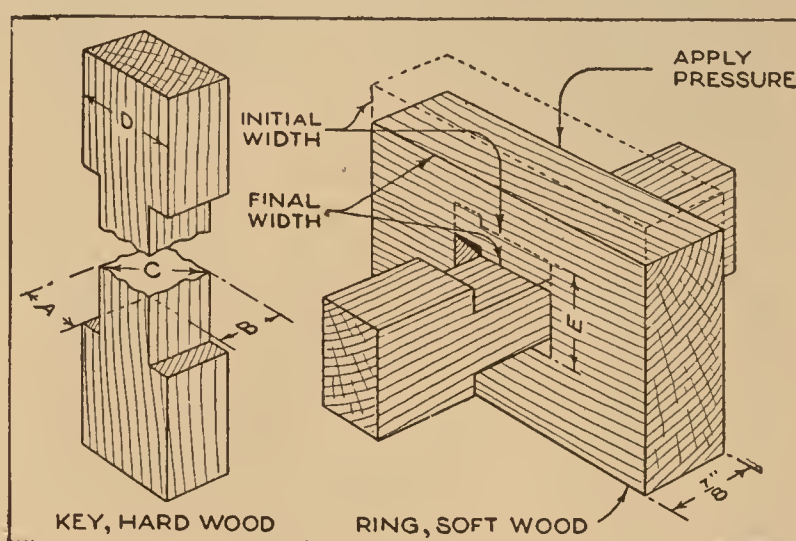
A Wooden Key-and Ring-Puzzle

By E. K. WEHRY

A PUZZLE which will baffle the ingenuity of many a skilled mechanic is illustrated by the drawing. The mystery of course is as to how the two blocks are put together. The small block, or key, may be made to slide very tightly in the hole in the larger one; it is thus apparent that it could not have been fitted in by any cutting process. The frame, or ring, should be made of good straight-grained soft wood, and the key of hard wood, both of about the same thickness. The surface of both blocks may be planed smooth, so that the blocks can be inspected all over for glued joints; there are no joints in either block.

The method of making the puzzle is as follows: Cut the two blocks to shape outside, and cut notches in the sides of the key so that dimension A, in the drawing, will be just slightly less than dimension B. Now caliper the diagonal of this smaller section, this giving the dimension C. Cut a rectangular hole in the center of the large block, of a width E, just slightly greater than this diagonal, and a length greater than the width D of the smaller block. Some notches can be made in the sides of the rectangular hole, as illustrated; these have nothing to do with the puzzle except that they are

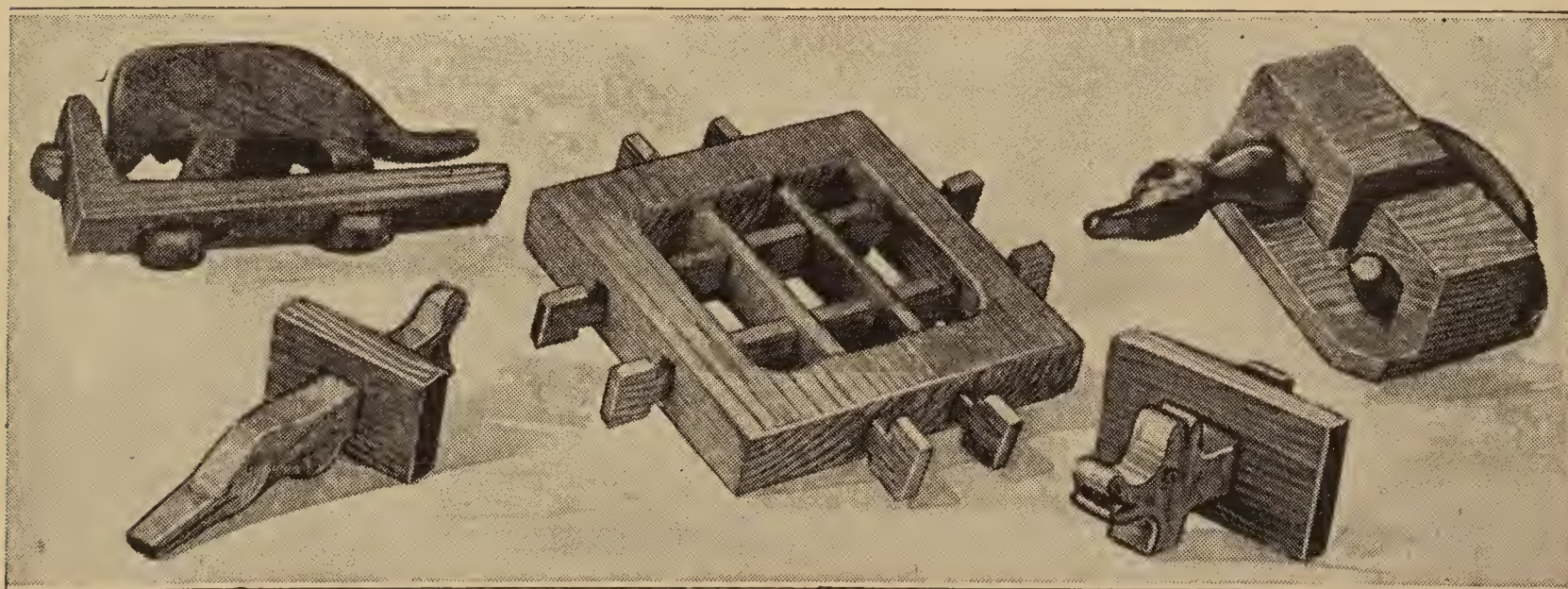
quite likely to lead the victim astray in guessing at its solution. If the hole is made according to these directions, the small block can be thrust through it, and



Not Only the Amateur but Even the Skilled Mechanic may be Mystified by a Puzzle Which Any Boy can Make Out of Two Wooden Blocks

turned upon its side, so as to occupy the position it will have in the completed puzzle.

The ring block is now thoroughly steamed or boiled in water, for one hour. It is then gripped in a good bench vise, with the key fitted into it, and screwed up as tightly as possible. When the wood has yielded a little, the vise is screwed up again, and so on until the



Various Wooden Animals are Shown Held in Wooden Frames or "Traps," All Made on the Same Principle as the Simple Puzzle. In the Center Is a Rather More Complicated Specimen, but Also Made without Joints of Any Kind

ring is compressed to grip the key tightly between its two sides. Then let the puzzle stand in the vise until the next day, when it will be dry, and can be removed. Two stout, hard clamps can be used instead of a vise.

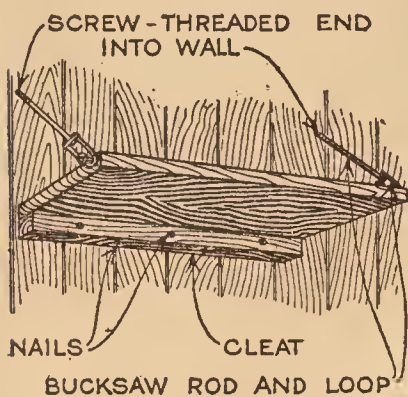
After one's friends have been sufficiently mystified by the question of how the two blocks were ever put together in this fashion, it is a simple matter to place the

puzzle in boiling water again for about 20 minutes, when the ring block will swell to its original dimensions, and the key can be taken out quite easily.

The photograph shows a number of modifications of the puzzle. All of them involve the same principle as the simple key-and-ring puzzle. Such a collection will form a curious ornament to the craftsman's shop or home.

Shelf Brackets from Old Bucksaw

The rods and loops from an old bucksaw were put to good use by a camping party, which was in need of an extra shelf in the camp. The turnbuckle itself was removed, the threaded ends of the two rods were screwed into the wall, and the loops which had engaged the ends of the saw frame were now hooked over nails near the corners of the shelf. Later the loops were sandpapered and enameled to improve their appearance.—H. K. Capps, Stahl, Missouri.



Drinking Cup Made from a Cow's Horn

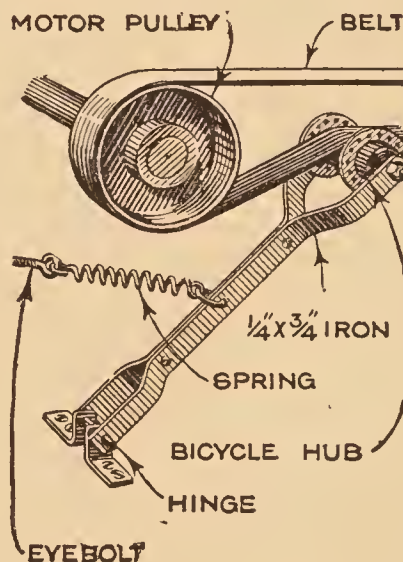
A cow's horn may be made into an odd and attractive drinking cup. A good-size horn, having a decided curve, is selected and the butt is cut off square, to form the base. At the point determined for the top of the cup, saw the horn almost through to the opposite side; then saw for the length of the horn, to form a strip for the handle, as shown in the drawing. This strip should be 6 or 8 in. long and about 1 in. wide. Scrape the handle down until it is $\frac{1}{8}$ in. wide at the end. Mix a strong solution of lime and water and boil it, soaking the handle in the solution until it is quite soft and pliable. Bend the strip of horn back into the form



of a handle, as shown, and tie with a stout cord. When dry, the handle will retain its shape with the cord removed. Scrape the inside of the horn thoroughly, and make a tight-fitting wood disk for the bottom, using fancy-headed tacks to hold it in place. Waterproof glue is used to close the seam between the horn and its bottom.

Bicycle Hub Makes Belt Idler

A ball-bearing idler, for a narrow belt, may be made from the hub of an old bicycle. The hub is removed from the bicycle frame and is attached to a substantial bracket, made by riveting two pieces of flat stock together near the center, and spreading the ends apart to accommodate the hub. The lower ends of the bracket are also expanded, for attaching the idler to the floor with a hinged joint. Tension of the idler against the belt is furnished by a stiff spring, one end of which is attached to the idler bracket, and the other to an eyebolt in the wall.—Frank Brunner, Richmond, Ind.



Why Hammocks Wear Out

Whether a hammock will wear out in one summer, or last for many years, depends largely on the amount of sag it has when in use. A hammock hung between hooks very close together, so that the ropes supporting it are almost vertical, is subject to a strain of but little more than half the weight of itself and the person sitting in it. Thus, when holding a boy weighing 100 lb., the pull on each hook may not be more than 55 or 60 lb. On the other hand, if the distance be-

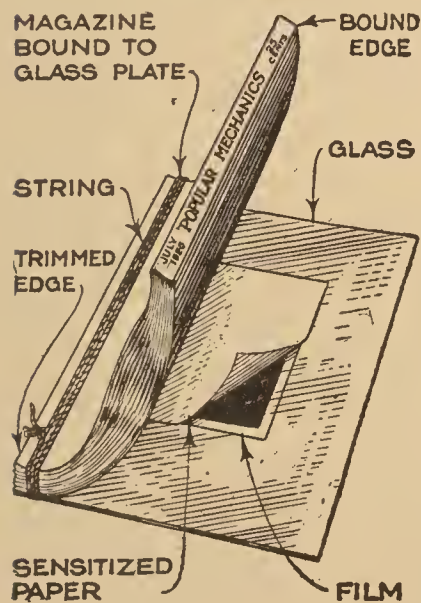
tween the hooks is nearly as great as the length of the hammock, so that there is very little sag, the tension on the hammock may reach dangerously high figures. For example, if the hammock ropes sag only 5° from the horizontal, the 100-lb. boy would cause the hammock to be stretched with a force of 572 lb.; if the hammock could be stretched so tight that there would be only 1° of sag, the tension would be 2,860 lb. Hammocks are not built to stand such strains, and the "moral" is that if a hammock is to last well, it must not be stretched between hooks too far apart.

Fasteners for Ironing-Board Cover

The metal clasps from discarded hose supporters may be used for fastening the cover to the family ironing board by attaching a clasp to each end of a short piece of elastic. Several of these fasteners are prepared and applied to the edges of the cloth on the underside of the board. These fasteners can be removed almost instantly.

Photo-Printing Frame from Old Magazines

Having need to make some prints in a hurry, an amateur photographer improvised quite a serviceable substitute for



his regular printing frame, that had become mislaid, from a sheet of glass and a magazine.

The magazine was laid flat on the glass sheet and tied to it with a piece of string in such a manner that the trimmed, or open, edge was bound to the glass, leaving the bound edge free. To use

this printing frame, the glass was placed flat on a table and the magazine raised, as shown in the drawing. Then the negative and sensitized paper, in their proper order, were laid on the glass as in a regular printing frame. Holding the sensitized paper with one finger, to prevent disarrangement, the magazine was rolled over parallel with the glass; the glass and magazine, held together by the hand, were lifted from the table, and the print exposed in the usual manner.

Filing Cabinet Built into a Desk

A compact home desk that combines filing cabinet, typewriter table, stationery



Two Bookcase Sections, a Wide Board, and a Filing Cabinet are Here Combined to Make a Compact Desk

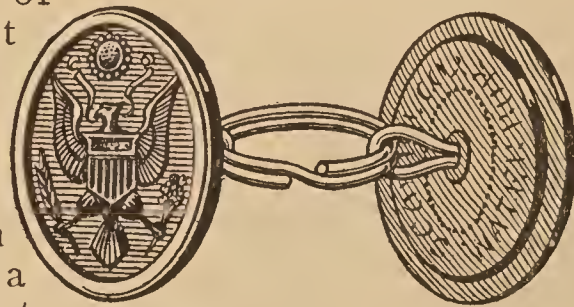
drawer, and cases for the books most often needed, is easily made as shown in the photograph.

A wide board is supported, at the right, by the bookcase sections and, at the left, by a cleat screwed to the side of the filing cabinet, the drawer at the top being used for stationery. This latter detail may be omitted or elaborated upon, to meet individual requirements. The filing cabinet is 12 by 16 by 35 in. and contains three drawers.—Berenice Aiken, Roswell, N. M.

Cuff Links from Uniform Buttons

A substantial number of ex-service men have enough sentiment to wear some small memento of

their recent military experiences, and such a souvenir, in the form of a pair of attractive cuff links, is easily made. Two small buttons from the old service uniform are put onto a small brass ring, as shown in the drawing, to form each link. If preferred, the eyes of the buttons may be cut off, close to the back, and the buttons soldered to blank links, which may be obtained from a jewelry shop.



Before attempting to cut a thread in a piece of wood, wax it with beeswax, and apply enough heat to make the wax soak into the wood—not enough to scorch it.

Pontoons for Stability in the Canoe

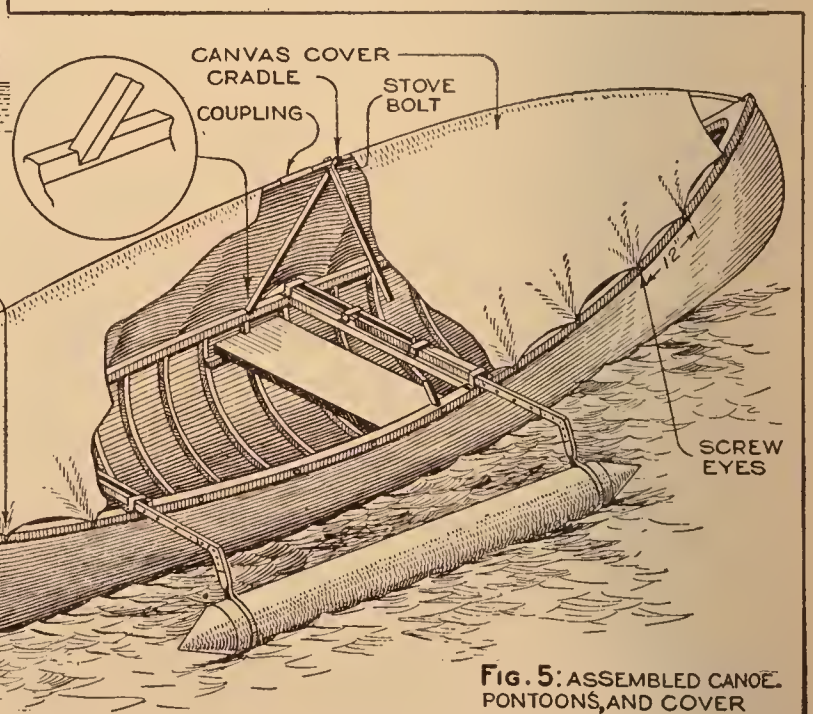
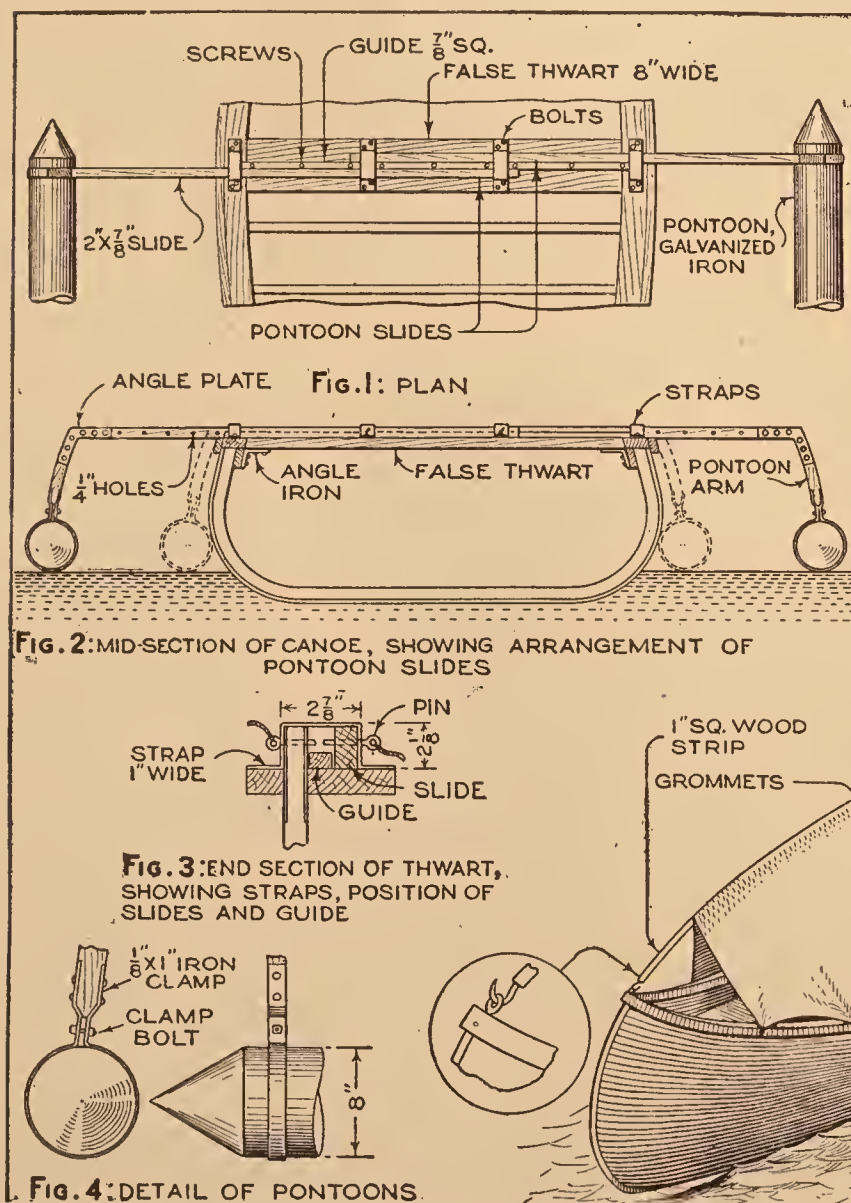
By L. B. ROBBINS

TO sleep in a canoe has always been considered the equivalent of making an appointment with the coroner, because the craft is likely to capsize with a sudden shifting of weight. However, one may sleep aboard a canoe in safety and also stand upright to "play" a gamey fish, or make a difficult landing, by equipping the craft with pontoons.

Two false thwarts are first provided; these should make a snug fit between the inside of the gunwales, one at the position of the center thwart and the other at the rear of the forward seat. The length of these thwarts will depend upon the beam of the boat at those points, and, as shown in Figs. 1 and 2, should come flush with the top of the gunwales. Angle-iron braces underneath hold the thwarts in place and make them readily removable; the guides are attached down the exact center of each, with screws, the heads being countersunk. Eight iron straps are provided, made as shown in Fig. 3, and four are attached to each thwart, as in Figs. 1 and 2, the outer ones coming directly over the gunwales. A hole is drilled through each side of the center straps to accommodate pins.

The slides, or outriggers, are made of good, straight-grained oak, about 6 in. longer than the outside width of the canoe at the point used. Four of these pieces will be required, and they should be smoothed down to slide easily under the straps without binding. Holes to coincide with those in the center straps are drilled in each piece at intervals of 2 or 3 in., for holding the slides in either the extended or housed position. One end of each slide is mitered for fitting to the pontoon arms. The pontoon arms are cut out and smoothed down to suit, and one end is mitered to fit the mitered ends of the slides, to which they are attached with iron angle plates, sunk flush with the wood and fastened with countersunk screws. These plates must be flush so that they will not interfere with the operation of the slide in the straps. When the slides and pontoon arms are assembled, each will resemble a hockey stick in appearance, the pontoon arms being parallel with the sides of the canoe, as in Fig. 2. The pontoons are merely air-tight cylinders made from fairly heavy galvanized iron, and provided with conical ends. The pontoons are held to the ends of the pontoon arms by means of iron clamps, as shown in Fig. 4. A hole is drilled in each clamp between the pontoon and the end of the arm to take a suitable clamping bolt, the tightening of which serves to hold the pontoons.

As a final touch, for use when cruising, a canvas cover may be added, as shown in Fig. 5; this drawing also shows the appearance of the canoe with the pontoons extended. A light, flexible wood strip is provided, a trifle longer



By Equipping an Ordinary Canoe with Pontoons and a Canvas Cover, the Canoeist is Enabled to Stand Erect When "Playing" a Gamey Fish or Making a Difficult Landing; He may Also Sleep Aboard in Safety and Comfort

than the distance between the bow and stern of the canoe, and a screw hook is turned into each end; a screw eye is inserted at each end of the boat to take the hooks on the ends of the strip, as shown in the detail. For convenience in stowing, this strip is cut in two at the center, and the ends are rounded off for 2 or 3 in.; a coupling made from a short length of tubing is provided to slip over the rounded ends of the strip. A folding cradle, as shown in the drawing, supports the center of the strip; and notches in the ends of the legs fit over the gunwales of the canoe, as in the detail. Light canvas is used for the cover, which fits over the whole canoe and buttons along the out-

side, this being accomplished by inserting grommets and small brass screw eyes at intervals in the edge of the canvas and the outside of the boat.

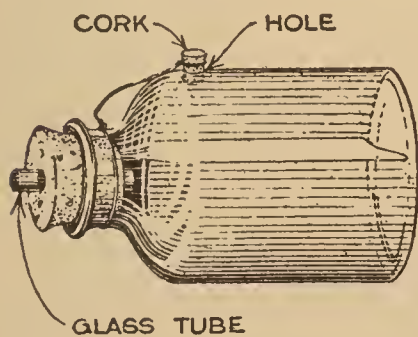
When under way and paddling along, the slides are pulled in and pinned in place so that the pontoons fit closely under the counter of the canoe, and as they clear the water they will not impede progress. When it is desired to use them for any purpose, simply slide out a pair at a time to the distance required, and secure them in place with the pins. Only a slight tipping motion of the canoe will then bring one or the other of them into contact with the water, making the craft entirely stable and safe.

Cheap Soap for Mechanics

Scraps of soap are put into a metal container with water and reduced to a paste by boiling. While the mass is in a semiliquid condition, a quantity of fine sawdust, or finely powdered pumice stone, is added and thoroughly mixed. When cool, this soap will be found excellent for removing grease and stains from the hands.

Pouring Small Stream from Bottle

In replenishing a storage battery with a small quantity of electrolyte, or for pouring small streams of any liquid, a bottle arranged as shown will prove quite convenient. A piece of glass tubing is tightly fitted into the cork. A hole is drilled through the side of the bottle at the point where the forefinger will rest when the bottle is

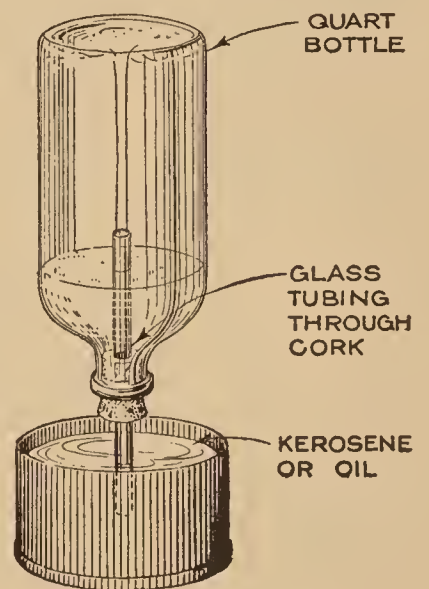


held in a pouring position. For this hole a small cork is provided, which is tied by a string to the neck of the bottle. When the bottle is tipped to pour, the cork is removed and the finger placed over the hole. Raise the finger and the contents will pour out in a steady stream; replace the finger and the flow ceases. To prevent evaporation, the bottle should be corked when put away.—L. B. Robbins, Harwich, Mass.

☞ For filing flat surfaces, it is convenient to have a file with the tang bent up at an angle, so that the handle can be gripped, and the hand will clear the work.

Vapor-Absorbing Power of Oils

An interesting experiment, that shows the tremendous absorbing power of oils for the lighter vapors from gasoline, is easily made. A quart bottle is dried, and then slightly warmed. When warm to the touch, a spoonful, or less, of ordinary gasoline is put into the bottle and allowed to stand for a minute. A cork, having a small hole drilled through its center and a short piece of glass tubing inserted through it, is placed in the neck of the bottle, which is now filled with gasoline vapor heavier than air.



Then place the bottle upside down into a vessel containing some kerosene, or light lubricating oil, as shown in the drawing. Slowly at first, the oil in the outer vessel will rise in the tube and be drawn into the bottle, and when it overflows, the absorbing surface is increased so much and so quickly that there is formed a partial vacuum in the bottle, causing the kerosene or oil to rush in with a great deal of force so that the jet strikes the top of the bottle and continues to play until the bottle is almost entirely filled.

This fact that the lighter vapors are so readily absorbed in heavy oils, is made use of in the manufacture of gasoline from natural gas by the absorption process.—E. Stetson, Okmulgee, Okla.

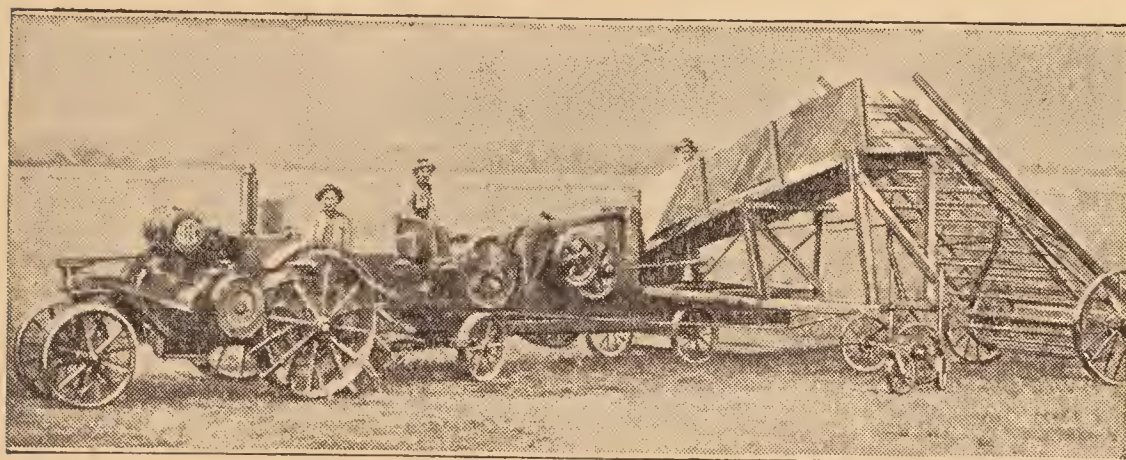
Novel Hay Baling Rig Saves Much Time and Labor

As a solution to the hired-help problem, a farmer rigged up some of his farm machinery to get his hay baled.

An extension, forming a sloping platform, was built to the left side of the baler, leading to the feeding chamber, or hopper. This platform was supported, at the outer end, on two caster wheels, and also guyed to the front of the baler. The hay loader was hooked up to dis-

charge the hay onto the sloping platform, on which it slid directly into the baler. The baler, having a stationary engine mounted on its frame, was operated in the usual manner. The whole arrangement was hitched to the tractor. The hay was gathered up from the swath and baled as the outfit was drawn across the field, at a great saving in time and labor. A sort of ground sledge, or stone

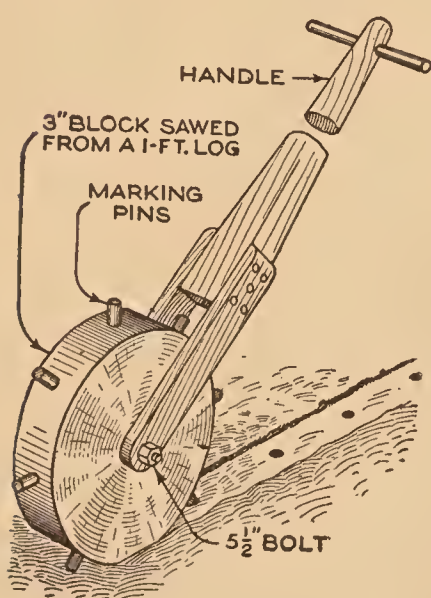
boat, was attached behind the baler, on which a man stood, to tie the bales. It also served to carry the bales to the end of the field. Three men were required to operate this combination; one to drive the tractor and the others to place the blocks and tie the bales, as they are finished. — Arnold P. Yerkes, Chicago, Ill.



With a Combination of Tractor, Hay Baler, and Hay Loader the Farmer Not Only Solved the Problem of Insufficient Hired Help, but Got His Hay Baled at a Great Saving of Time and Money

Adjustable Revolving Garden Marker

In transplanting it is very desirable that the plants be spaced a uniform distance apart. The drawing shows an ad-



justable marker that can be pushed along the row as fast as a person can walk, making plainly visible marks the required distance apart. The wooden wheel of the marker may be made by sawing a 3-in. disk from a log, 1 ft. in diameter, or it may be built up from the

bottoms of several old fruit baskets. A number of 1-in. holes are bored around the circumference of the wheel, at intervals of 3 or 4 in., and six or eight wooden plugs are provided; these should project about 2 in. A hole is bored through the center of the marking wheel for a bolt, which holds it to the handle. The marker shown in the drawing is provided with holes for eight pegs which are spaced about 4 in. apart; therefore, if it is desired to make marks for setting out plants 4 in. apart, a peg is driven in each hole, and if a distance of 8 in.

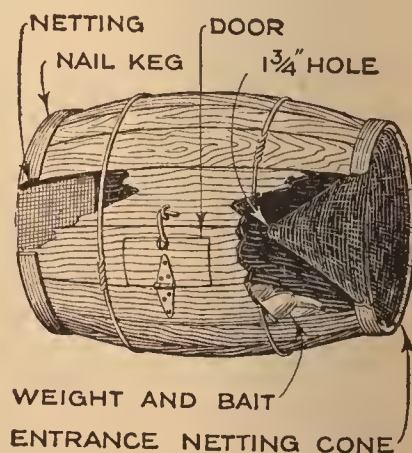
between plants is desired, alternate plugs are withdrawn. As the wheel revolves, the weight of the roller forces the projecting pegs into the earth.—H. F. Grinstead, Columbia, Mo.

Protecting Polished Floors

The housewife who is the proud possessor of nicely polished floors can protect them from many scratches by gluing pieces of felt, cut from an old felt hat, to the bottoms of the legs of tables and chairs.—Kate R. Brower, Parshall, N. D.

Minnow Trap Made from Keg

An old keg and some wire netting are the materials required for making a satisfactory minnow trap. The heads are knocked from the keg; a piece of netting is rolled into the form of a cone to fit inside one end of the barrel, the ends being held together with fine wire or cord. The tip of the cone is cut off to make an opening into the trap. The outer edge is bent back over the edge of the barrel and held in place by fitting

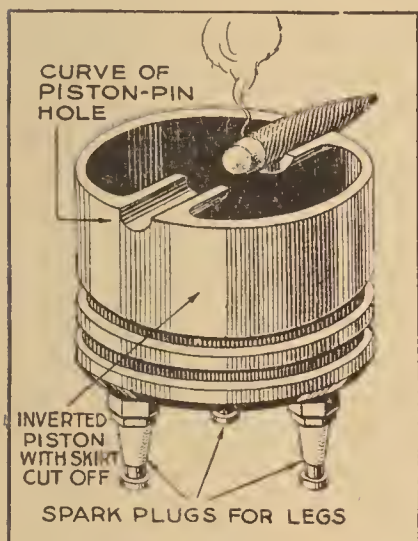


one of the hoops over it. The opposite end of the keg is covered, in the same manner, with a piece of netting. A small hinged door, with a hook to hold it shut, is provided for removing the catch when the trap is hauled from the water.

To set the trap, a heavy stone is placed inside the keg, for a weight, to keep it beneath the surface. The trap is baited with a lump of dough, and some pieces are scattered on the cone and around the entrance. Minnows entering the small opening are unable to find their way out. The trap should be set in shallow water, where minnows are most likely to be found.—Chester Cooper, Glenville, W. Va.

Ash Tray Made from Motor Piston

The enthusiastic motorist who likes to have his surroundings reflect his hobby can produce quite an attractive and substantial cigar stand and ash tray from an old motor piston. The skirt of the piston is cut off on a line with the center of the piston-pin hole, and discarded, thus leaving the upper part of the piston with the piston-pin bosses cut in half, to form the cigar holders as shown. Three holes are drilled and tapped in the piston head, to accommodate $\frac{1}{2}$ or $\frac{7}{8}$ -in. spark plugs, as desired. Three spark plugs of the same length and make are screwed into the holes for legs. Such an ash tray is not easily overturned and, if made from an aluminum piston and polished, it constitutes an attractive addition to the furnishings of the den or office.—C. C. Spreen, Warren, Ohio.

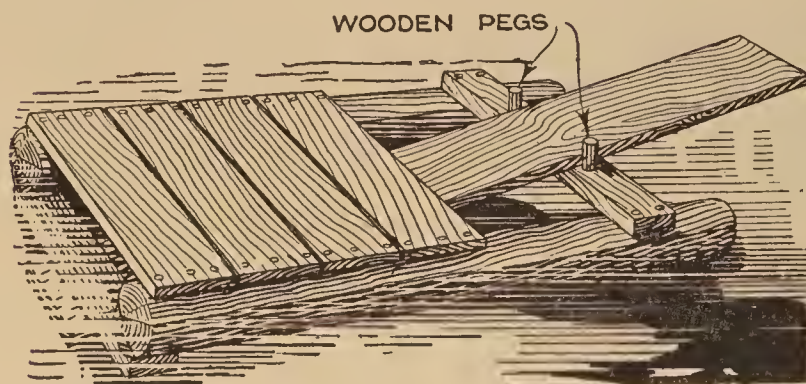


Stones Broken by Hot Water

Any large stone whose presence is undesirable in the field or yard, may be broken up without the aid of explosives. The earth is dug away around the stone until about three-fourths of it is exposed. A fire is built against the stone and allowed to burn until the latter is thoroughly heated throughout. When a temperature approximating red-hot is reached, pails of cold water are thrown on the hot stone, which will crack open in pieces that one person will be able to remove without difficulty.

A Simple Diving Raft

Campers on the shores of a lake or river frequently discover to their dismay

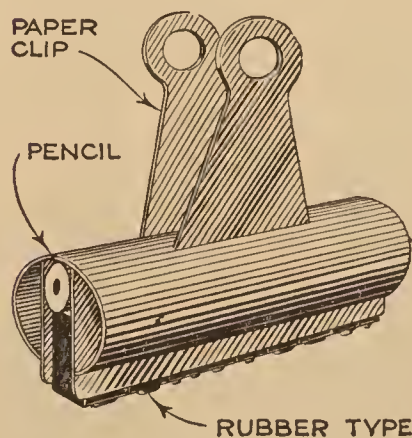


Springboard Mounted on a Heavy Raft Makes Diving Possible When the Water off Shore is Shallow

that the water near the shore is too shallow to permit diving. The answer to this is a floating springboard, such as shown in the drawing. Two logs, about 20 ft. long and 18 in. in diameter, are fastened, about 5 ft. apart, with heavy planks which form the platform. The springboard rests on a heavy wooden crosspiece, and the end underneath is attached to a similar crosspiece. To prevent the springboard from shifting its position, a wooden pin is driven into the front crosspiece on each side of the board. Instead of using one heavy plank for the diving board, two comparatively thin planks may be arranged like the leaves of an elliptic spring, the longer board being on top. A stone anchor prevents the raft from drifting too far from the shore.—Harold E. Benson, Boulder, Colo.

Paper Clip as Rubber-Type Holder

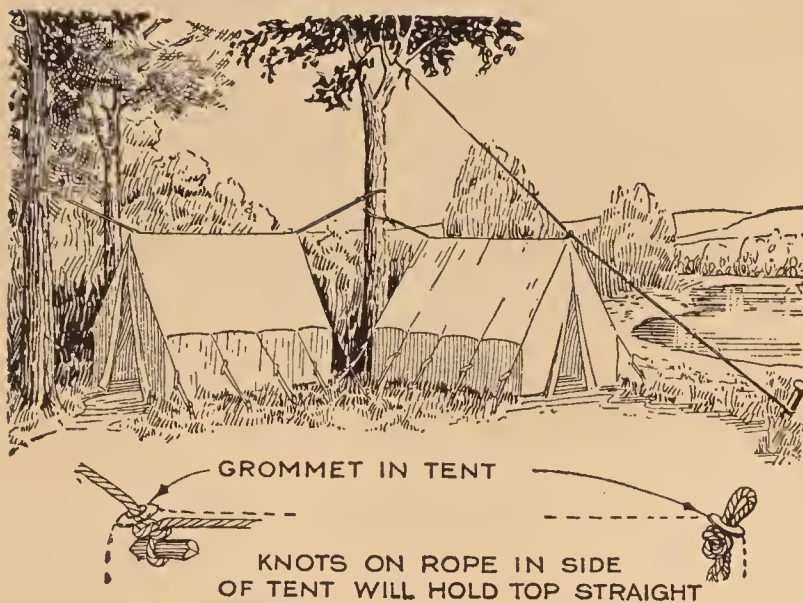
Having some $\frac{1}{4}$ -in. rubber type but lacking a type holder, an ingenious individual conceived the idea of holding the letters in a small spring paper clip, as shown in the drawing. A piece of round wood, about $\frac{5}{16}$ in. in diameter, or a section of pencil, prevents the type from sliding back into the clip, and keeps them properly aligned.



Larger clips may be used for larger-size type, or for holding more than one line of smaller type, in which case a thin strip of metal will be required between the wood block and the type in order that the type faces may be on the same plane.—Sinclair T. Roberts, Philadelphia.

Erecting Tents without Poles

Though many a camper has observed and remarked upon the well-known fact



The Disadvantage of Tent Poles Is Always Apparent to the Camper, but Poles Are Unnecessary Nuisances, as the Drawing Shows

that tent poles are a nuisance, it has possibly never occurred to many of them that it is quite possible to erect a tent without poles, using ropes instead. The ridgepole is eliminated by a rope running through the inside of the tent. The ends of this rope are brought through the grommets provided at each end of the tent for the spikes of the end poles, and a knot is tied under each grommet, or eyelet, to prevent the tent from sagging in the center. The outer ends of the rope are attached, at the proper height, between two trees, as in the drawing. Should there be only one tree available one end of the tent rope is tied to the tree; the front end of the tent is supported by a rope running from a branch of the tree to a stake which is firmly driven into the ground somewhat in front of the tent and in line with its center.—J. A. Bargquist, Chicago, Ill.

Beads from Rose Petals

Necklaces made from rose-petal beads are not only attractive in appearance but have a delightful rose odor. The petals are gathered, and chopped finely with a knife; if a food chopper is available, the results are better. The chopped petals are placed in an iron vessel of some sort. Should this be somewhat rusty it is really an advantage, since the rust (iron oxide) tends to make the beads a richer black in color. The petals should be allowed to stand for about a week after they have been chopped. Do not allow them to become dry; if there is any tendency toward this, a little water may be sprinkled over

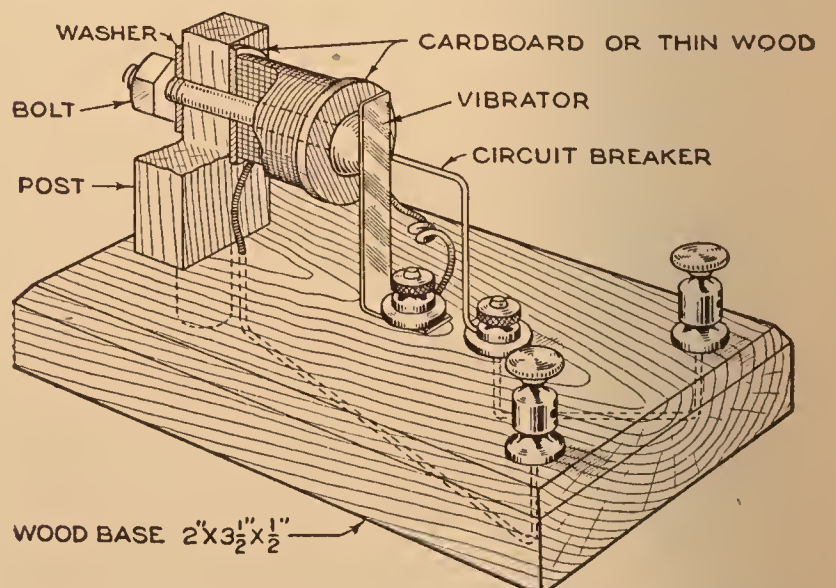
the mass. At the end of the week, sufficient water is stirred in with the petals to make a soft mass. The beads are made by rolling bits of this mass between the thumb and finger. While still soft, each bead is pushed onto a piece of wire or a hatpin and allowed to stand for several days until quite hard.—S. Leonard Bastin, Bournemouth, Eng.

Metal Lath in Boiler for Canning

By cutting a piece of expanded-metal lath to fit loosely into an ordinary clothes boiler, an excellent false bottom is made for preserving by the cold-pack process. This false bottom does not spoil the flavor of fruits and vegetables being canned by this method, as occasionally happens when the bottom is made of wood. The expanded-metal bottom also has the advantage of permitting freer circulation of the boiling water around the jars and cans.—J. Hug, Ames, Ia.

Simple Homemade Buzzer

A small, though satisfactory buzzer can be easily made by the young electrician from a few odds and ends of metal and several yards of wire. A hardwood block is provided for the base, and a hole is drilled at one end for the post which supports the coil. The wire is wound around an ordinary bolt, as shown, the flanges at the ends being made from heavy cardboard or thin wood. A hole is drilled through the wooden post, and the coil is attached to it by screwing a nut on the threaded end of the bolt core. The vibrator is a strip of tin, fastened to the base with a binding screw from an old dry cell. The circuit breaker, or interrupter, is bent from a piece of heavy copper wire, attached to the base by one of the binding posts, which have been



Simple Electric Buzzer for the Young Electrician, Made from Easily Obtainable Parts

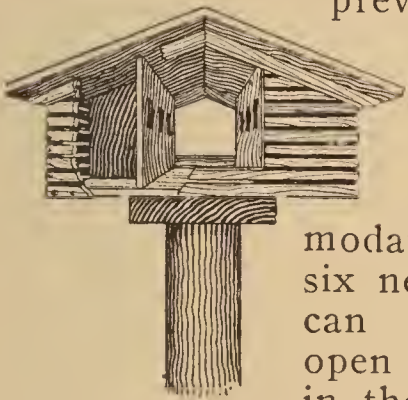
taken from dry cells. The manner of connecting the wires is clearly shown in the drawing. The tone of the buzzer is regulated by moving the circuit breaker closer to or farther from the vibrator, and with a little experimenting a satisfying buzz will be obtained.—Chas. Martin, Warner, Alta.

Barrel Hoops from Buggy Tires

Sheet-iron barrel hoops speedily rust to pieces when the barrel is kept in a cellar, and painting them gives but little protection. A substantial and more durable hoop can be made from old buggy tires by welding the ends together. At least one such heavy hoop should be driven over each end of the barrel.

Bird House of Novel Design

Every hatching season, the bird lover is appalled at the number of young birds killed by falling from the nest. It was to prevent these accidents



that the bird house, shown in the drawing, was designed. This house has accommodations for as many as six nests, which the birds can enter through the open court or passageway in the center. The sides

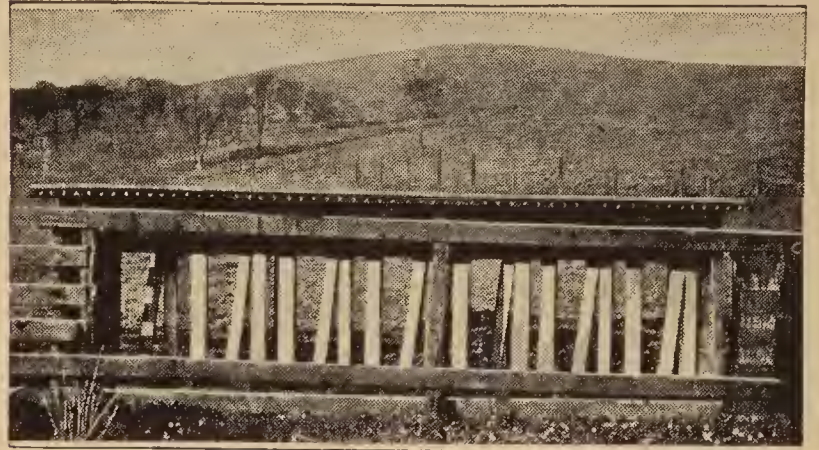
and ends of the house are covered with wooden slats, 1 in. wide, spaced $\frac{1}{2}$ in. apart. The entrance holes are cut well up from the bottom, to make it more difficult for the fledglings to escape before they are able to care for themselves. The open sides and ends provide light and ventilation, and at the same time give sufficient shelter against the elements.

A Simple Monochrome Filter

By using a simple monochrome filter, amateur photographers can determine, before making an exposure, exactly how the finished picture will appear. Such a filter is made from a 2-in. square of clear purple or dark blue glass, which can be purchased from any dealer in art glass. The edges of the square are ground, or bound with gummed-paper tape, so that the glass can be carried in the pocket and handled without danger. When this filter is held close to the eye, all objects seen through it appear to be of one color, as in a photographic print.—John E. Hogg, Los Angeles, Calif.

Stanchion Built into Fence

The photograph shows a covered calf stanchion that is built directly into the

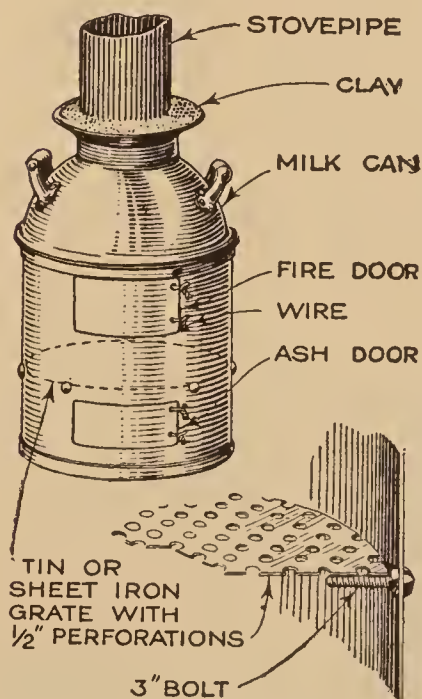


A Covered Calf Stanchion, Built Directly into the Fence, Is Always Dry and Occupies No Room in the Pasture

fence, so that the farmer may call each calf into this frame and feed such grain as the animal needs, without going into the calf lot. Being covered, it is dry at all times, and occupies no room in the pasture field.—C. M. Baker, Wooster, Ohio.

Camp Heater Made from Milk Can

It is a common experience among campers that, while the days may be hot, the nights become excessively cool in some parts of the country. The drawing shows one camper's contribution to the comfort of the rest of his tribe.



An old milk can was obtained from a neighboring farmhouse, and five or six holes were drilled several inches from the bottom. Three-inch bolts were inserted through the holes, and secured by tightening the nuts inside the can. The perforated sheet-metal grate is supported by the protruding bolts inside the can, as shown. Two doors, about 6 in. square, were cut for feeding the fire and removing the ashes. In the absence of hinges the doors were fastened to the can with wire loops run through holes punched in the tin. The stovepipe is inserted into the mouth of the can, and any surrounding space is stopped up with wet clay.—Paul J. Kordes, Milwaukee, Wis.

How to Build Small Electromagnets

By JOHN A. PRIOR

THE first piece of electrical work to be attempted by most amateurs is the construction of some kind of electromagnet, for such magnets, besides being

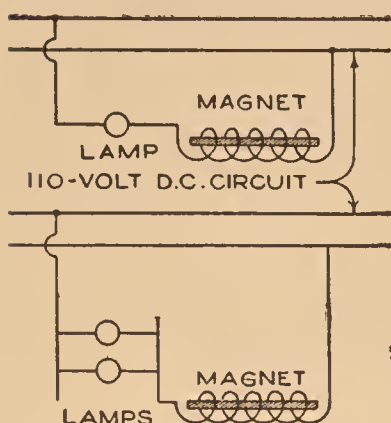


Fig. 1: LOW-VOLTAGE MAGNETS CONNECTED THROUGH LAMP BANK

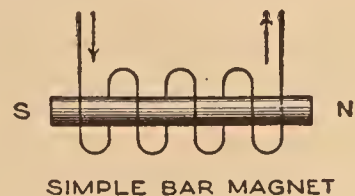


Fig. 2: BAR-TYPE MAGNETS

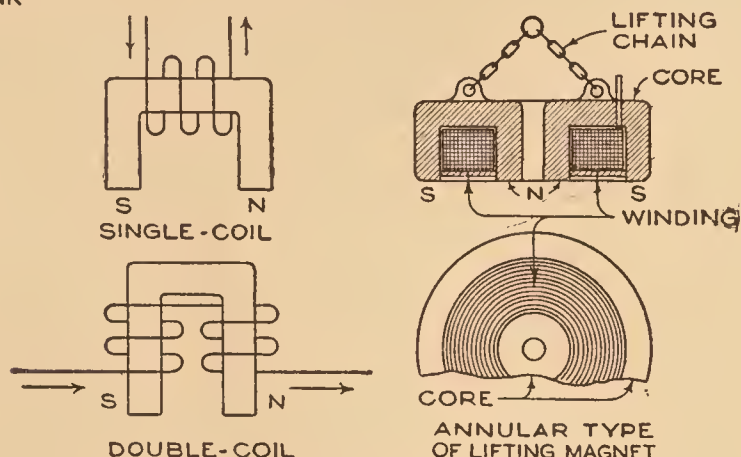


Fig. 3: WINDINGS FOR HORSESHOE-TYPE MAGNETS

Figs. 1, 2, and 3 Illustrate Diagrammatically the Way in Which Magnet Windings are Directed and Shaped

fundamental to almost every kind of electrical apparatus, are interesting in themselves.

While almost any winding on any iron core constitutes a sort of magnet, far better results are to be had by correct proportioning. It is the purpose of this article to give an idea of what these proportions are, in the smaller sizes of magnets, for low voltages. These magnets can also be used on regular lighting circuits; the making of small magnets wound especially for such high voltages is a tedious proposition.

For use on a direct-current lighting circuit, connect the magnet in series with a lamp of slightly greater normal amperage. For example, the $\frac{1}{4}$ -ampere sizes will operate well in series with a 40-watt lamp, on a 110-volt direct-current circuit, as diagrammed in the upper half of Fig. 1, or on a 220-volt circuit, with a pair of 40-watt lamps connected as shown below. Likewise for the $\frac{1}{2}$ -ampere sizes, use two 40-watt or three 25-watt lamps on a 110-volt circuit. All lamps should be of regular circuit voltage.

The general construction of electromagnets is familiar to almost everyone. The essential parts are a soft-iron core,

surrounded by a winding of insulated copper wire. The bar magnet is the simplest type and is diagrammed in Fig. 2. Here also is shown a turbogenerator rotor, which is also of the bar-magnet type. For increased power, a magnet core is more often bent into a "U," or horseshoe shape, so that both poles are brought to the load. A few forms are shown, with method of winding indicated, in Fig. 3. The annular form is simply a modification of the horseshoe, often used in lifting magnets. Figs. 4, 5, and 6 show three forms of core suitable for small magnets; the one in Fig. 6, although more difficult to make than the others, gives complete protection to the winding, and is very suitable for a magnet to be used for practical purposes.

A small current in a properly designed magnet will support a heavy weight. It will not, however, exert this force for any considerable distance from the pole faces. A great lifting magnet, capable of handling a 10-ton casting, will not disturb a knife in a pocket 10 ft. away—though it may disturb a watch very seriously. Even the scale on a rough casting may interfere with the ability of a magnet to hold it, and has to be considered in design. Neither can a magnet exert as great a force on comparatively small objects as on larger ones. For instance, a magnet capable of lifting a 20,000-lb. "skull-cracker" ball (such as is dropped some 20 ft. on a scrap pile, to break it up) cannot hold 1,000 lb. of scrap iron.

It will be seen, then, that although a

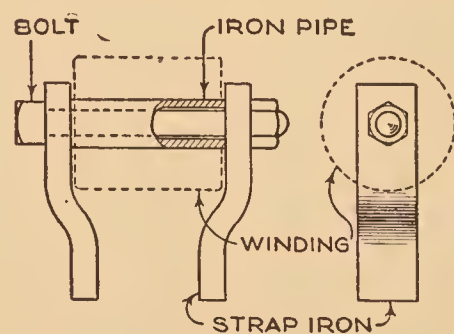


Fig. 4: SINGLE-COIL, HORSESHOE-TYPE

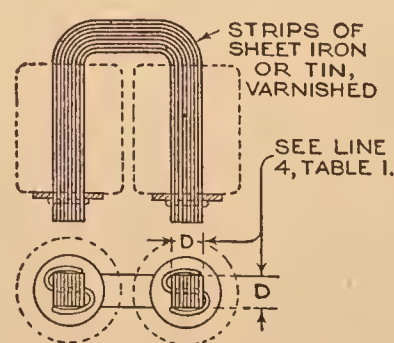


Fig. 5: LAMINATED DOUBLE COIL FOR EITHER A.C. OR D.C.

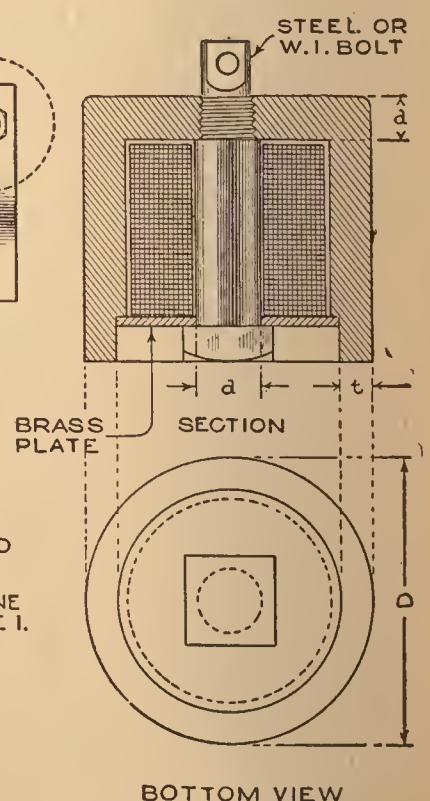


Fig. 6: ANNULAR LIFTING MAGNET DIMENSION $t = \frac{a^2}{10}$ OR GREATER

Figs. 4, 5, and 6 Show Practical Methods of Construction for Small Electromagnets Operated from Batteries

magnet can be designed accurately for a specific purpose, it is impossible to give exact data for one to be used for general duty. Therefore, the data given in Tables I and II must be considered as suggestive, rather than hard and fast. It applies to magnets working under favorable conditions, that is, lifting flat, smooth iron objects, of cross section at least equal to that of the core. Under these conditions, the rated holding power can be obtained. It will be noted that the smaller sizes are less economical of current than the larger, chiefly because of the resistance of the air gap between the poles and the load, which is about the same for all sizes.

Theoretically, a holding magnet does no work, and therefore should consume no power at all. The power used in the actual direct-current electromagnet is all lost in overcoming the resistance of the winding. Therefore, by using sufficient wire of proper size, the current may be made very small indeed. In practice, a balance is struck, determined by practical considerations. In the tables below, to avoid extremely heavy windings, a fairly high value of the current has been taken in the calculations; but it is not higher than can be drawn economically from a battery.

If it is desired to use a different winding and current on any size, it is only necessary that the product of the turns of wire times the current should be the same as that given as ampere turns in

methods in Table II. Both give 300 ampere turns; in one case, 1/4 ampere by 1,200 turns; in the other, 1/3 ampere by 900 turns. It would develop the same pull

TABLE II.
For Finding Dimensions of a Winding

Voltage	Holding Power in Pounds	Current in Amperes	Number of Turns in Winding	Gauge of Wire	Diameter of Wire in Decimals of One Inch	Length of Wire Needed
1 1/2	2	1/4	700	28	.012	105
	5	1/4	900	25	.018	180
	10	1/4	1,200	23	.022	300
	10	1/3	900	23	.022	225
3	2	1/4	700	31	.008	100
	5	1/4	900	28	.012	170
	10	1/4	1,200	26	.016	300
	10	1/3	900	26	.016	225
6	2	1/4	700	34	.006	100
	5	1/4	900	31	.008	170
	10	1/4	1,200	29	.011	300
	10	1/3	900	29	.011	225
	20	1/3	1,200	26	.016	425
	20	1/2	800	26	.016	280
12	10	1/4	1,200	32	.008	300
	10	1/3	900	32	.008	225
	20	1/3	1,200	29	.011	425
	20	1/2	800	29	.011	280
	50	1/2	1,600	24	.020	850
	100	1	1,500	21	.028	1100

with 1 ampere and 300 turns, or .1 ampere and 3,000 turns. So one can suit himself in the matter of windings, given sufficient wire, and patience in winding it on. The core is the same in any given size, whatever the winding.

The windings are best made up of cotton-covered magnet wire; in fact, this is about the only form in which such small sizes of wire can be had in most places. Rather than wind directly on the core, it is better to make up the winding on a false core of wood or paper, wrapping it with tape before placing it on the iron core. The winding may be made up in two coils, if desired.

The core may be of any shape of section, but where the coils rest upon it, it should be round or nearly so, or a waste of wire will result. In any case, its area should be at all points equal to, or greater than, that of the round core listed in the table. Other dimensions are made to suit the winding.

These magnets will operate, after a fashion, on alternating current, if the voltage is high enough, but will heat up from core losses. This heating can be much reduced by making the core of iron

TABLE I.
General Data for Small Electromagnets
of Any Voltage

Pull, or Holding Force, in Lb.	2	5	10	20	50	100
Ampere Turns	175	225	300	400	800	1,500
Area of Core (Minimum) in Sq. In.	.04	.1	.2	.4	1.0	2.0
Diameter of Round Core in In.	1/4 to 3/8	3/8 to 1/2	1/2	3/4	1 1/8	1 1/2

Note: Pull is calculated for a cast-iron armature of area equal to that of the core; the air gap is assumed, .005 in. for smallest size.
Other core dimensions should be determined to suit the form and size of the windings, making the core as short as convenient.

Table I. For example, the 10-lb. magnet can be wound by either of the two

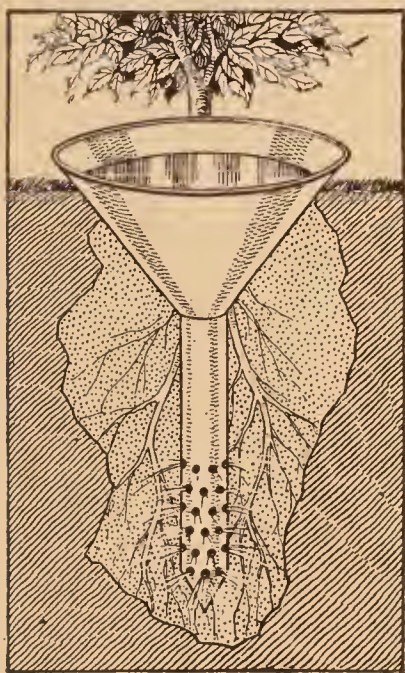
wire, or of a bundle of sheet-iron strips, insulated with paper or varnish, as shown in Fig. 5. To get sufficient voltage it will be necessary to connect through lamps to the lighting circuit, exactly as outlined above. It will be impossible to get as much holding power as can be had with direct current, without overheating.

Closely allied with the subject of electromagnets is that of solenoids, for use with a core which is to be pulled into the coil, thus operating some mechanism. Such cores necessarily have a large air gap; that is, there is no nearly complete magnetic circuit of iron, as in a horseshoe magnet. For this reason, it is hardly pos-

sible to give very definite data for the pull to be expected from a certain winding. The table will give suggestions for the windings of such solenoids, though the pull will of course be much less than that given for magnets. In general, the pull depends on the cross section of the core and the ampere turns of the coil, so that a greater pull can be obtained by increasing either factor. For best operation, however, a reasonable proportion should be maintained between the two. With a solenoid and plunger, a motion of an inch or more is readily obtained, though this involves, of course, a corresponding reduction of the pulling force.

Funnel for Watering Plants

Slight results are obtained from watering plants in summer unless enough water is applied to reach the roots, which



is particularly desirable with plants that have extensive root systems or long taproots. The funnel arrangement shown in the drawing is easily made and gets results with a minimum of water.

The funnel spout is perforated, as shown, and the lower end is provided with a point, so that it may be easily thrust into the ground. In operation, the spout is pushed into the earth, close to the root of the plant to be watered, and the funnel is filled with water, which flows through the holes in the perforated spout.—H. C. Crocker, Edwardsville, Ill.

Removing Obstruction from Rifle Barrel

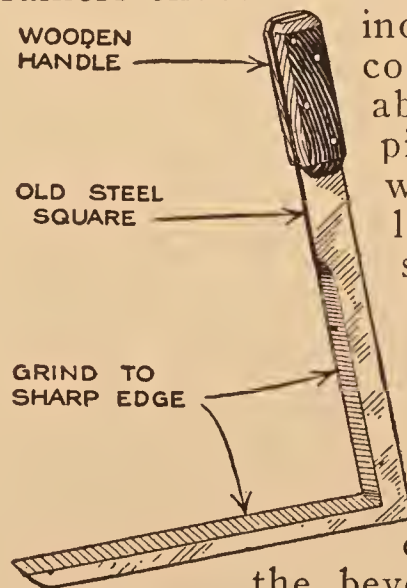
It frequently happens that a cleaning rag, or perhaps a section of the cleaning rod, becomes tightly jammed in a rifle barrel; if it is found impossible to get it out by ordinary means it will usually yield to the method described.

Procure a solid steel rod, slightly smaller than the bore of the rifle and a little longer than the barrel. Measure with this and mark on the outside of the barrel to indicate the location of the obstruction inside. Fill to the muzzle

with thin lubricating oil and let stand for half a day, then reverse and repeat the operation from the breech end. Then place the barrel, at the point of the obstruction, into the flame of a gasoline torch, or Bunsen burner, and turn the barrel slowly to heat it evenly. Because of the lubrication of the barrel and patch, charring of the patch, and expansion of the barrel from the heat, it will almost always be found possible to force out the obstruction with the steel rod. After removing the obstruction, the barrel should be cooled gradually, and it may be rubbed with an oily rag while cooling. It is not necessary to bring the barrel to a red heat, and, carefully done, this method will injure neither the barrel nor its finish.—Van Allen Lyman, Balboa, C. Z.

Sickle Made from Steel Square

A carpenter's steel square, whose usefulness ended when the markings became indistinguishable, was converted into a durable sickle. A two-piece wooden handle was riveted to the long side of the square, as shown, and the end of the short side was ground off at an angle. The inside angle of the square was beveled off by grinding,



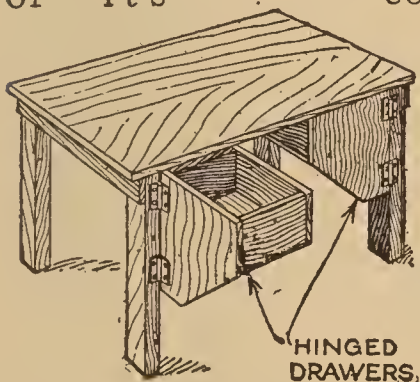
the bevel extending up the long side about 10 in. Such a sickle will be found quite useful for trimming hedges and cutting light brush, as well as for cutting grass.—C. A. Black, Jr., Hightstown, New Jersey.

Making Spark and Throttle Rods

Excellent rods for connecting carburetor throttles or ignition timers with their operating levers can be made from steel spokes such as are used in wire wheels; motorcycle spokes are of a good size. The headed end is bent at right angles, if not already bent, to go into the eye of the operating lever; if the diameter of the spoke is less than that of the eye, a short section of tubing can be cut to make a bushing. For the other connection, the threaded end is bent at right angles and the nipple screwed in place. In some cases, the nipple will fill the hole or eye, and in other cases a thin section of tube will have to be used as a filler. It will be necessary to heat the spoke at the ends for bending, but the center should be left hard, as this adds much to its strength for the purpose. For long bends, such as may be required to allow the rods to clear obstacles, no heating is needed. —Howard Greene, New York, N. Y.

Hinged Table Drawer

The swinging drawer, as ordinarily constructed, generally sags under the weight of its contents. A remedy



for this condition is shown in the drawing. The front of the drawer is a board extending for a foot or more below the bottom, and hinged to the table leg. A

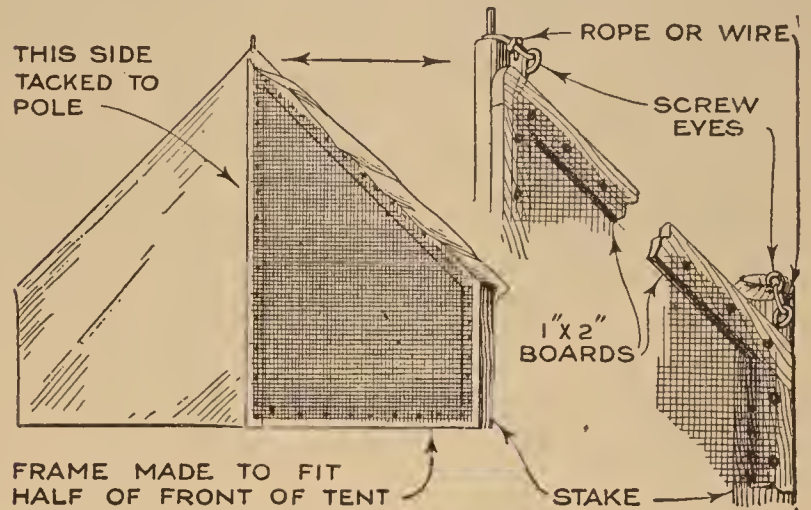
longer bearing for the drawer to swing on is thus provided, which acts as a brace to support the weight. Such drawers never stick, and the entire drawer and its contents are exposed to view at a single movement.

House Numbers Made from Auto Tags

Old automobile-license tags, which have the numbers pressed in the steel, can be used as molds for making house numbers. Melt some lead, zinc, or other soft metal, and pour it into the sunken side of the plate, the latter being set on a level surface. The heads of small nails may be molded into the metal, and these used later for attaching the numbers to the house. After the molds have cooled, they may be touched up with a file or sandpaper.—Leonard Stubbs, Noblesville, Indiana.

Screen Door for Tent

While homes are provided with screen doors to prevent entrance of insects, the

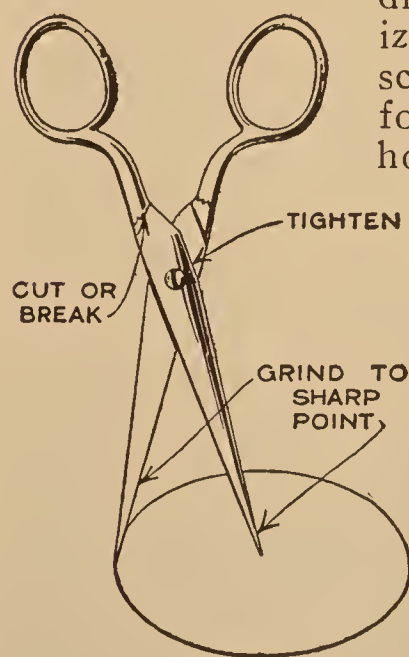


A Screen Door for the Camper's Tent is Opened by Lifting, the Upper Edge being Hinged

tent dweller unwillingly entertains a variety of pestiferous insect life, and assumes that an enterprising colony of hornets in his tent is the thing to be expected. By equipping the tent with a screen door, the camper is enabled to show a light in his tent after dark without permitting insects to enter. A light wooden frame is made, and covered with wire cloth, or mosquito netting, as shown in the drawing. A stake is driven at one corner of the tent, to which a corner of the door is attached with screw eyes and a wire link, the upper corner being similarly attached to the end pole.

Toy Dividers from Old Scissors

The amateur mechanic frequently feels keenly the lack of a scribing compass, or dividers, without realizing that a pair of old scissors—usually to be found in any household—would dispose



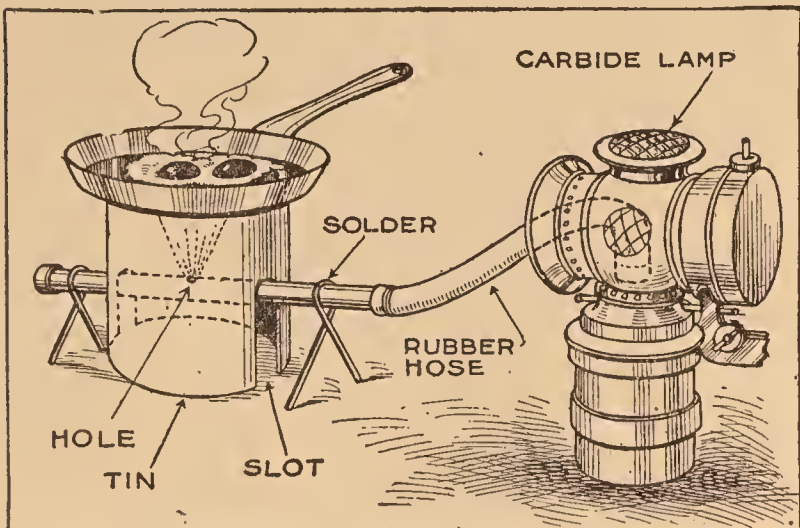
of the difficulty. The handles are broken, or cut off, well down toward the blades, and the latter are ground down to fine points, as shown. The screw, or rivet, holding the blades together, is tightened up to prevent the legs

from moving from the position in which they are set.

Ⓐ piece of good plate glass will make a satisfactory emergency surface plate.

Carbide Lamp Makes Gas Stove

A carbide bicycle lamp, or automobile acetylene tank or generator, may be easily arranged to make a convenient stove for

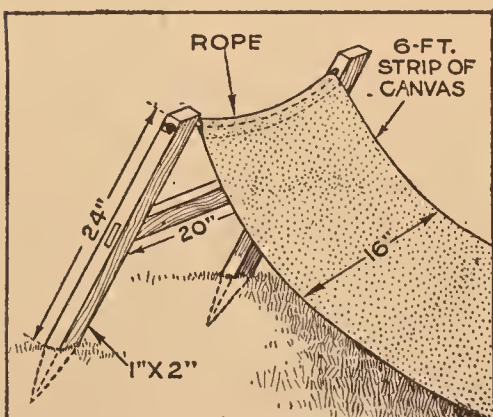


Acetylene Headlamp Provides the Camper or Tourist with a Ready and Convenient Means of Preparing His Food

the tourist or camper. A piece of small gas pipe, about 1 ft. long, is plugged at one end, and a small hole is drilled about at the center, as shown. The pipe is held above the ground by heavy wire legs, soldered to the pipe. A tin cylinder, of the size desired, is made, and slots are cut in opposite sides, that it may fit over the pipe. To use the stove, the burner tip is removed from the headlamp, and a piece of rubber tubing is connected to the lamp and the open end of the pipe. When the tin cylinder is placed in position and the gas has been lighted, at the hole in the pipe, the coffeepot or frying pan is placed on top of the cylinder, and the food is cooked, or heated, in a very short time.—Wm. J. Barry, Huntington, W. Va.

Portable Back Rest for Beach Use

A convenient and readily portable head and back rest, for use on beach or lawn, is made from several hardwood strips, and a length of canvas, combined as in the sketch. The long side strips are mortised at the center, and the crosspiece is provided with a corresponding tenon at each end as in the drawing. The lower ends of the sidepieces are pointed. Near the upper end of each crosspiece, a hole is drilled for a piece of rope, which passes through them and



through the hole provided at one edge of the canvas strip. The rope is secured to the outside of the strips with knots.

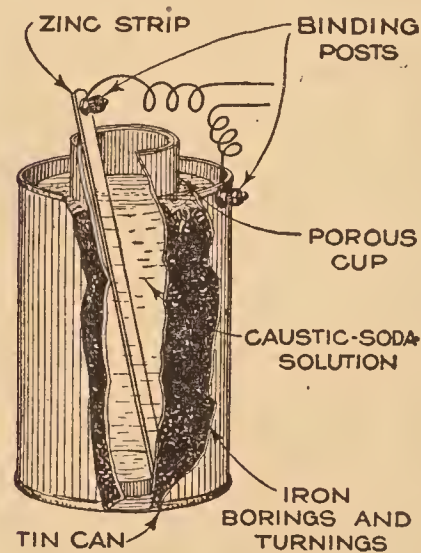
In use, the rest is placed at an angle, as shown, and the pointed sidepieces are forced into the ground, the person sitting on the extended canvas. When not in use, the seat may be taken to pieces, and rolled into a small bundle—F. H. Mason, Victoria, B. C.

Birds and Blue Paper

Some interesting experiments that have been conducted show that seeds and crops may be protected from the attacks of birds by the use of blue paper. Strips of bright-blue paper tied to strings were stretched across seed beds, and no birds ventured near. Pieces of blue paper were also attached to fruit trees, and the feathered robbers carefully avoided the position.

A Cheap Wet-Battery Cell

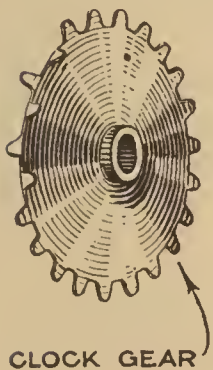
The high cost of dry cells has encouraged many to make and use homemade cells of various kinds, and the one described has the merit of cheapness and efficiency, as well as long life. For the battery jar, an old can, about 6 in. high and 4 in. in diameter, is used. A porous cup is required, and this is made by rolling a strip of blotting paper around a stick, 1½ in. in diameter, and securing the ends with melted paraffin. The bottom of the cup is made by standing it on a smooth surface which has been greased with vaseline, and pouring in plaster of Paris, or melted paraffin, to a depth of about ½ in. When completed, the porous cup is stood in the center of the can, the outside space is filled with chips, borings, and turnings of iron, and a strip of zinc is placed inside the cup, as shown in the drawing. The battery solution is made by dissolving caustic soda in water until it will take up no more; a saturated solution, in other words. The cell is filled with this solution to within an inch of the top, and connection is made with the zinc strip and the can by means of binding posts, as shown. Owing to the caustic character



of the battery solution it should not be allowed to come into contact with the skin or clothing. Such a cell has a voltage of about 1.2, and will deliver approximately two amperes on short circuit, depending on the purity of the chemicals and the fineness of the borings and turnings. The internal resistance of these cells is high, and best results are obtained by connecting a battery of them in parallel, if a large amount of current is required. However, one or two such cells will give good results for light service, such as a doorbell circuit.

Grooved Pulleys from Clock Wheels

Every experimenter has need, at times, for one or more small grooved pulleys that will run true. A simple way of securing such pulleys is to take clock gears of the proper size and bend alternate teeth to opposite sides, somewhat in the same manner that "set" is given to the teeth of a saw. The teeth are bent so that a V-shaped groove of about 60° or 90° will be formed, as shown in the drawing. If a gear of sufficient size is unobtainable, a disk of heavy galvanized iron may be used by making a series of radial cuts around the edge and bending alternate teeth, as described.



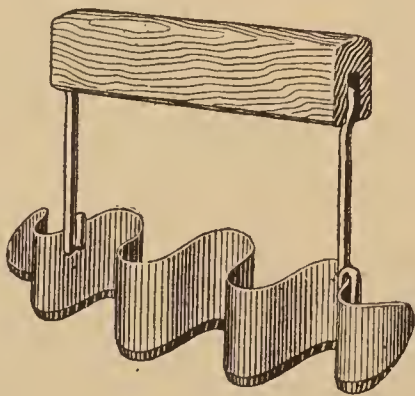
CLOCK GEAR



PULLEY

Corrugated-Steel Food Chopper

An old saw blade is used to make the food chopper illustrated. The metal is bent while red-hot, then tempered and sharpened before the handle is attached.

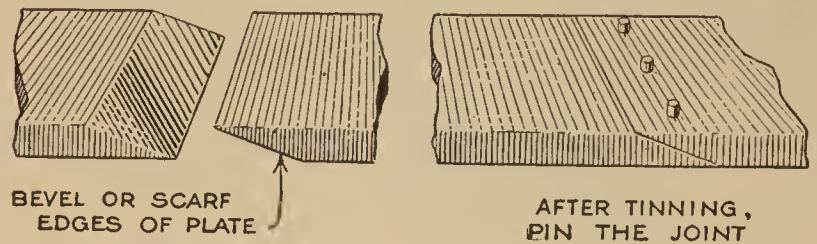
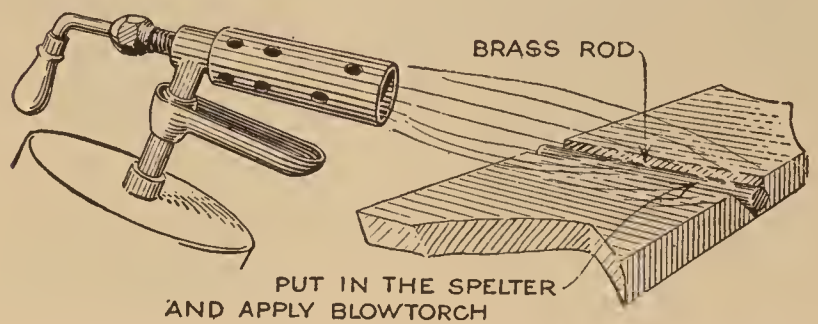


Electric Lamp Raises Bread Dough

To keep bread dough at a uniform temperature throughout the night, the vessel containing it is set underneath a box which has a hole cut in its top for the insertion of a 25-watt electric lamp. The heat from the burning lamp is slight, but sufficient to raise the dough nicely and prevent its "falling" with a drop in the outside temperature.

Soldering and Brazing Seams

In joining sheet-metal edges, instead of making a plain butt joint, it is much

BEVEL OR SCARF
EDGES OF PLATEAFTER TINNING,
PIN THE JOINTPUT IN THE SPELTER
AND APPLY BLOWTORCH

For Soldering and Brazing Sheet-Metal Seams, Brass Wire and Rod can be Used Advantageously, as Shown in the Two Sketches

better to make a beveled joint with auxiliary pinning, as illustrated in the upper half of the sketch. After forming the bevels, each side is tinned, and the surplus solder wiped up. Several brass pins are placed in drilled holes, as illustrated, and the parts are then sweated together. When the exterior surface is smoothed off, the joint is hardly noticeable, and the seam is much stronger than a plain soldered one.

In making brazed joints, it has been found advantageous to chamfer the edges, as illustrated below. Place brass spelter in the V-shaped cavity, run a piece of brass wire along on top of it, and place more spelter around the wire. When the blowpipe is applied, the brass wire assists in carrying the heat rapidly along the junction, fusing the spelter and making a close bond. The method aids in avoiding the presence of porous spelter, thus giving a joint which is air and water-tight and, besides, has greater strength.—G. A. Lucrs, Washington, D. C.

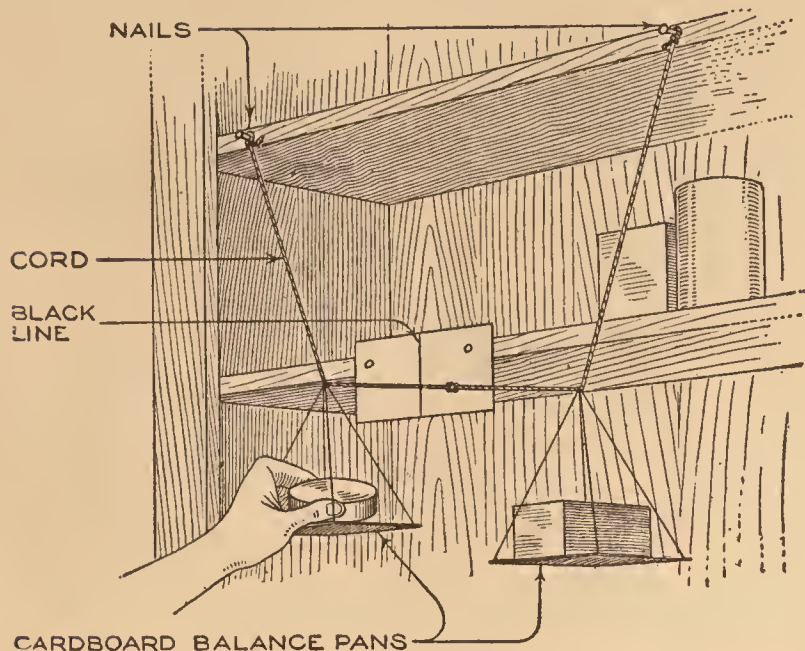
Measuring Contents of Cans

Do you get your money's worth when gasoline, or other liquid commodities are bought "by the can"? Here is an easy method of determining the contents of cylindrical containers.

Measure the diameter and the height in inches. Multiply the diameter by itself and the product by the height; take $\frac{1}{3}$ of 1 per cent of that total and the result is the number of gallons, correct to one-fiftieth. For more exact results 2 per cent is added to the total, or 1 gal. for every 50 obtained.

Scales without Springs or Bearings

A pair of scales can be quickly fitted up with two nails, a piece of string, and



Differing Entirely from the Conventional Scale, the Results Obtained with This Device Are Remarkably Accurate

some pasteboard. Drive the two nails, about 2 ft. apart, into the edge of a shelf. Take a piece of cord, about 42 in. long, and tie a knot exactly in the middle of it and the ends to the nails, as shown. Cut two pieces of cardboard, of the same size, for the pans, and suspend them an equal distance on each side of the knot by threads. The threads holding the pans should be tied tightly, to prevent the pans from slipping down the cord.

Just beyond the horizontal cord, a card, having a vertical line ruled on it, is placed in such position that the knot is exactly opposite the ruled line when the pans are still and balancing.

To use this scale, the article to be weighed is placed in one of the pans, when the knot will be pulled to one side of the vertical line on the card. Pile weights on the empty pan until the knot is drawn back to its first position in front of the mark. The amount of weight required to make the knot line up with the ruled line indicates the article's weight.

Finishing Glossy Photographs

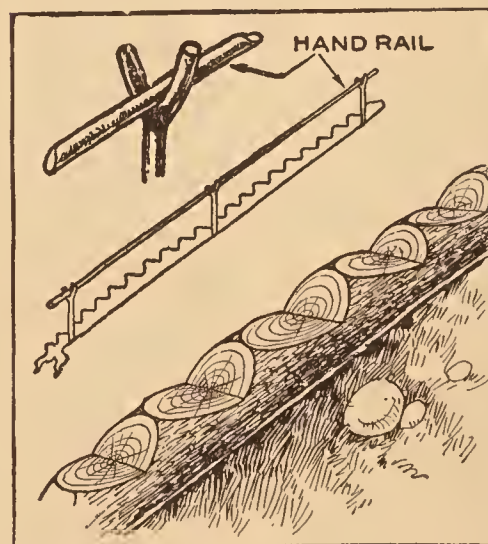
Though the professional photographer knows better, many amateurs continue to struggle with the solution of benzol and paraffin on their ferrotype plates, to obtain glossy prints. Benzol in combination with paraffin, or other greases, is often unreliable and is the cause of many smudgy, dust-specked prints, unjustly blamed on unclean plates. The amount of paraffin is another bothersome matter, for should too much be used the print never will come off.

A solution of plain commercial acetic acid will give good glossy prints, and is much more satisfactory to use than the old-time mixture mentioned. Plates that have been used with the old benzol solution are cleaned by rubbing with a tuft of cotton soaked in alcohol or gasoline. A solution of 1 oz. acetic acid to 10 oz. of water is sprinkled on the plate, rubbed in with a piece of cotton, and wiped off with a cloth. The plate should then be polished by rubbing with a piece of dry cotton.

After the prints have been fixed and thoroughly washed, they should be placed in a bath composed of 1 oz. acetic acid to 16 oz. of water, and allowed to remain for about 10 minutes. Before placing the prints on the ferrotype plate, they should be wiped off with a tuft of cotton, under running water. By this method, prints dry before a fan, or in a draft, in less than five minutes, if well blotted, while 20 minutes is quick time for "peeling" a print when the benzol solution is used.—Edwin Kemp, Baltimore, Md.

Steps Made from Tree Trunk

Where lumber is scarce and steps are wanted to reach to the top of an embankment, or sharp incline, they can be made at trifling cost from the trunk of a tree, and such steps will outlast the ordinary board ones.



If the length of the steps is great, one or more logs, or tree trunks, may be laid end to end. The steps are cut out, as shown in the drawing, with an ax or saw, so they will be as nearly level as possible; the larger the tree trunk, the larger and more comfortable will be the steps. A handrail is provided by driving forked stakes into the ground, at intervals, on one side of the steps, and laying poles in the forks, as shown in the accompanying illustration.

¶The man in charge of a filling station, in order to prevent pilfering from his cash drawer, built onto the side of it a sliding contact, which rings an electric bell whenever the drawer is opened.

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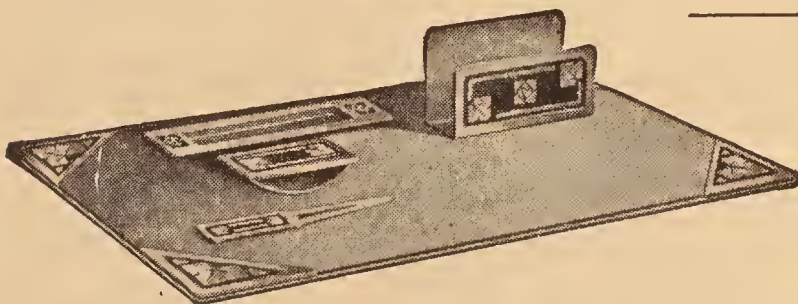
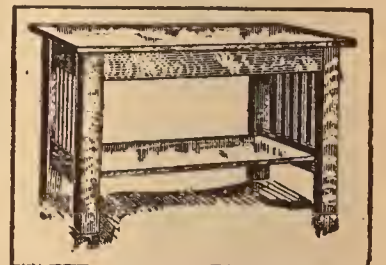
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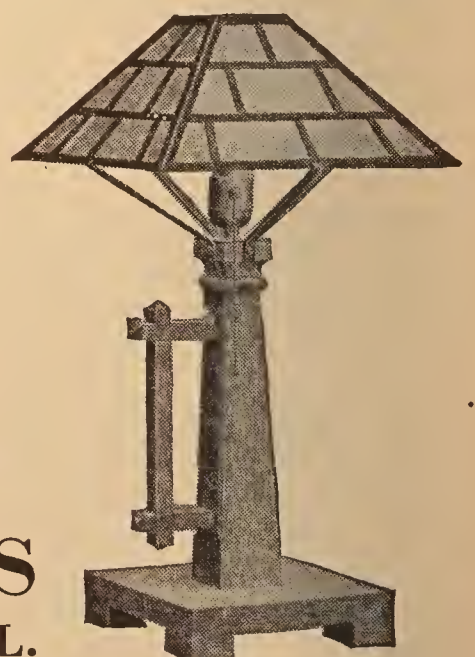
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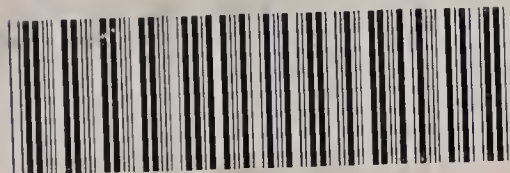
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